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BRITISH MEDICAL JOURNAL

LONDON SATURDAY MAY 15 1954

MANAGEMENT OF RHEUMATOID ARTHRITIS WITH PROLONGED CORTISONE ADMINISTRATION*

BY

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After three years' experience at the West London Hospital in the treatment of a series of cases of rheumatoid arthritis with cortisone, we feel that it may be of interest to summarize our results to date. In a previous publication (Copeman *et al.*, 1950) we reported a short study of the effect of cortisone and other steroids in rheumatoid arthritis, and described certain methods for clinical assessment. We later published a longer study of the effects of continuous cortisone administration in the same disease (Copeman *et al.*, 1952). The present paper is a continuation of those studies.

This report is on 20 cases of rheumatoid arthritis, 14 of which have received cortisone for more than two years, and all for at least a year continuously (Table I).

TABLE I.—*Duration of Cortisone Treatment*

Months:	36	35	34	33	32	31	30	29	25	22	18	17	16	Total
No. of cases ..	2	3	1	2	1	1	2	1	1	1	2	1	2	20

All the patients selected had previously suffered from active rheumatoid arthritis for at least two and a half years, and the majority for much longer, the average duration of the disease before cortisone treatment being 6.8 years. None of them were able to carry out their normal occupations, and all were regarded as severe cases. They had lost their independence, and described themselves as "crippled." These patients had been under observation and treatment for some time, and the more standard methods, such as adequate rest, salicylates, and gold salt injections, had failed to suppress the progress of their disease.

From this series of 20 cases 17 have now been returned to a working life in their various spheres, although, as the analysis in this report will show, the actual degree of functional improvement varies from case to case.

*This work has been aided by grants from the Dan Mason Research Foundation of the West London Hospital Medical School, the Empire Rheumatism Council, and the Medical Research Council.

Realizing that a real cure in any case was unlikely, we decided to assess our results on a practical functional basis. Accordingly, if the disease was suppressed sufficiently to enable normal work to be resumed and maintained we regarded the result as satisfactory; if the patient was able to return to work but still complained of considerable pain we termed the result moderate; and if the patient could not resume work it was held to be unsatisfactory.

Analysis of Results

Any opinion concerning the value of a particular form of treatment must depend on whether the emphasis is placed on its ability to cure the disease or on its power to relieve symptoms enough to enable the patient to regain functional or social independence. No cure has yet been found for rheumatoid arthritis, and the present study stresses the fact that cortisone must be continuously administered in order to retain improvement. Of our 20 patients who were initially unable to work, however, 17 have returned to their occupations and have continued to carry them out. The practical value of such improvement obtained through cortisone must, however, be weighed against the possible dangers resulting from long-term treatment with this drug.

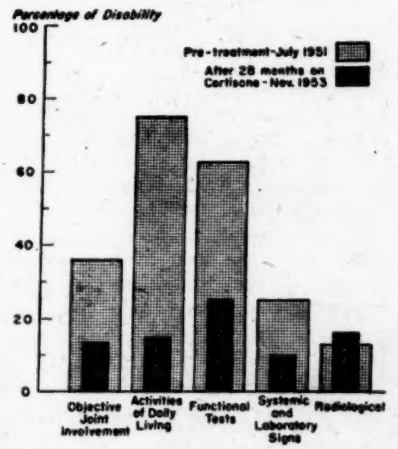

Chart showing the effect of long-term cortisone administration on the different components of rheumatoid arthritis (Case 7). Note the marked improvement in functional capacity, moderate improvement in signs of activity of the disease, and deterioration in radiological involvement.

TABLE II.—*Results*

Case No.	Description	Condition Before Treatment	Present Condition	Time on Cortisone	Daily Maintenance Dose of Cortisone	Results as Assessed by Functional Improvement
1*	Housewife aged 48. R.A. 8 years	Doing only very light housework	Working. Cooking and housework	36 months	100 mg.; or 60 mg. hydrocortisone	Satisfactory
2	Army officer aged 33. R.A. 5½ years	Partly bedridden; could walk 30 yards	Full-time clerical work. Drives invalid chair. Considerable pain from secondary osteoarthritis of hips	36 „	100 mg.	Moderate. Walks with difficulty
3	Housewife aged 40. R.A. 4½ years	Unable to dress herself or do housework	Working, and leading a normal life	35 „	50 „	Satisfactory
4	Housewife aged 36. R.A. 12½ years	Unable to dress herself or run her home	Working. Can do housework with difficulty. Only partial suppression	35 „	62·5 „	Moderate. Oedema and some pain
5	Housewife aged 43. R.A. 5 years	Unable to do housework, lift anything, do her hair, or get out of a bath	Working. Leading a busy social life entertaining for her husband; much hampered by her knees	35 „	100 „	Moderate. Much pain
6	Superintendent water inspector aged 45. R.A. 14 years	Unable to work	Working full-time with much travelling	34 „	62·5 „	Satisfactory
7	Treasury official aged 35. R.A. 7 years	Just managing to work with long periods of sick leave. Unable to dress himself	Working full-time without difficulty	33 „	37·5 „	„
8	Clerk aged 34. R.A. 8 years	Unable to work or do housework	Working. Has completed training as a dressmaker. Arthrodesis of left wrist	33 „	75 „	„
9	Housewife aged 36. R.A. 5½ years	Able to do light cooking only	Working. Able to do much more in her home, but hampered by her knees from walking any distance	32 „	50 mg., plus fortnightly injections of 50 mg. hydrocortisone into both knees	„
10	Housewife aged 31. R.A. 11 years	Unable to do housework or look after children. Walked with a stick	Working and leading a normal life, hindered only by deformed feet	31 „	62·5 mg.	„
11	Typist aged 21. R.A. 3½ years	Unable to work	Working full-time and leading a normal life	30 „	62·5 „	„
12	Chiropodist aged 54. R.A. 10½ years	Unable to work and permanently in hospital	Full-time clerical work in spite of much permanent damage	30 „	87·5 „	„
13	Railway maintenance worker aged 44. R.A. 4½ years	Bedridden. Much muscle-wasting and joint effusion	Not working, though mobile and independent and capable of light employment	29 „	75 „	„
14	Housewife aged 51. R.A. 4½ years	Unable to do housework or shopping	Working and leading a normal life. Some tenderness and swelling of right wrist and left knee	25 „	75 „	„
15	Gold blocker aged 50. R.A. 2½ years	Unable to work	Working full-time	22 „	37·5 „	„
16	Housewife aged 49. R.A. 8 years	Unable to look after herself	Not working. Can do only light housework. Marked depression on a higher dose	19 „	75 „	Unsatisfactory
17	Schoolteacher aged 41. R.A. 5 years	Unable to work	Working, but has much stiffness in ankles and knees	19 „	62·5 „	Moderate. Acne and moonface on higher dose
18	Housewife aged 52. R.A. 4½ years	Unable to run her home or carry anything	Working. Leading a normal life, but has some pain in hands and feet	17 „	62·5 „	Satisfactory
19	Children's nurse aged 52. R.A. 5 years	Unable to look after herself	Not working. Unsatisfactory response with hypertension	16 „	75 „	Unsatisfactory
20	Housewife aged 23. R.A. 5 years	Unable to do housework or look after child	Working and leading a normal life	16 „	75 „	Satisfactory

In order, therefore, to assess the true value of this therapy we have analysed in each case the effect of cortisone on various important components of the disease process, such as the objective joint changes, the patient's functional capacity, clinical and laboratory evidence of activity, and the radiological changes. Table II shows the results of this analysis in the whole series, and the Chart gives a graphic representation of the changes in a particular case.

These cases have been examined in detail every few weeks since the start of treatment, and the various components of the disease process assessed according to the following categories (Table III).

TABLE III

	Joint Involvement	Activities of Daily Life	Functional Tests	Systemic Signs and Lab. Tests	Radiological
Marked improvement	—	7 } 18	8 } 15	—	—
Moderate improvement	14	11 }	7 }	15	—
Unchanged	1	1	3	3	12
Deterioration ..	5	1	2	2	8
Total No. of cases	20	20	20	20	20

Objective Joint Involvement.—This was measured by examination of the joints for swelling, tenderness, and range of movement; the recordings were charted each month.

Activities of Daily Life (*Functional Capacity*).—At the outset of this trial a set of test questions was drawn up to estimate the patients' chief limitations in the conduct of their everyday life—for example, ability to dress, speed of dressing, ability to shave or do hair, ability to bath themselves, ability to walk, speed of walking, ability to climb stairs, ability to work, number of analgesics needed daily, how often awakened by pain.

Functional Tests.—Ten functional tests were adapted for each patient, depending on the joints involved. Among these were the power of grip, using a baumanometer cuff, starting at 30 mm. Hg (normal 260 mm. Hg +). Certain common functions, such as taking off a jacket, jumping, or standing on the toes, were also timed. These tests can be arranged to give a composite picture of the patient's functional abilities and can be carried out in a few minutes.

Systemic Signs and Laboratory Tests.—The clinical signs of activity apart from joint changes are fever, loss of weight, and muscle-wasting. The laboratory tests we have used consistently are the sedimentation rate (Westergren) and estimation of the haemoglobin level.

Radiological.—*X*-ray films taken before treatment included all the main joints involved at that time. The points particularly observed for change subsequently were soft-tissue swelling, osteoporosis, cartilage and joint erosions, and loss of joint space. A number of our cases have shown evidence of radiological progression in spite of the fact that their functional ability has none the less improved with cortisone.

Dosage Schedule

To find the optimum maintenance dose it is necessary to employ some method of assessing the clinical activity of the disease, and we have found that by measuring joint tenderness and function, together with the patient's own account of his pain and mobility, at regular intervals this can be achieved with reasonable accuracy. The patients in this series were seen and assessed weekly or fortnightly in the early stages, and once there was evidence that the symptoms and signs were being adequately suppressed the maintenance dose was found by reducing the initial dose by small amounts at intervals of not less than five days. A maintenance dose of 50 mg. a day or less was aimed at, but could by no means always be achieved. When the maintenance dose had been established the patients reported as out-patients every four or six weeks for observation.

In some cases a low maintenance dose will successfully suppress the inflammatory signs in all but one or two joints, often knees. We have found that by the use of hydrocortisone (compound F) as an intra-articular injection every few weeks, or occasionally at longer intervals, we can suppress this residual inflammation, and we have in addition sometimes been able to lower the patient's oral dose of cortisone.

In our early cases we adopted the scheme of dosage originally suggested by Hench *et al.* (1949), in which on successive days 300, 200, 100 mg. were used. We soon found, however, that the response provoked in this way tended to be too dramatic, and so led to subsequent disappointment on the part of the patient if this rate of progress did not continue. We therefore adopted a routine initial dose of 100 mg. daily, and with this it proved possible to measure the patient's response after about five days. In more recent cases in this series we have lowered the initial dose still further to 75 mg. daily; a level which has proved to be equally satisfactory in most cases.

Variation of Maintenance Dosage

The maintenance dose may have to be increased temporarily when conditions of extra stress occur, but should be lowered again as soon as possible. The average maintenance dose by the oral route in this series has been 69 mg. a day, which is the same as that reported by Fischer and Brøchner-Mortensen (1953) in Denmark.

Fourteen of our patients have received cortisone continuously for over two years, and during this period their dose requirements have not altered to any large extent, although in two cases the dose had to be increased somewhat. In Cases 6 and 8 the dose was progressively reduced during the first few months of treatment to 25 mg. cortisone a day, and was maintained satisfactorily at that level for some months. It was then thought probable that patients who need such a low dose might be able to dispense altogether with the drug, so it was stopped, with the unfortunate result that the disease relapsed at once. In neither of these cases were we ever able to lower the maintenance dose down to 25 mg. a day again.

We believe that the dose of cortisone should never be altered on account of surgery. Healing has proceeded normally after all operative procedures undertaken on our patients, notably in emergencies such as strangulated hernia (Case 12) and evacuation of a haematoma (Case 1), and in planned surgery such as an arthrodesis (Case 8). In the three cases of peptic ulceration which occurred (Cases 4, 7, and 12) the dose of cortisone was lowered slightly, but in each instance the lesion healed normally with ordinary medical treatment.

Side-effects

It is important to try to estimate the likelihood of the occurrence of side-effects in each case. Such an assessment often fails because the maintenance dose required cannot be accurately foretold. Experience has shown that in general men can tolerate a higher dose than women without developing side-effects, and that obesity and "moon-face" are particularly apt to occur in women near the menopause. Most of the side-effects we have encountered were mild and could be controlled by merely lowering the dosage and supervising the diet, or adjusting the sodium or potassium intake; but over a long period they may sometimes becomes troublesome enough to offset the functional improvement gained.

We have divided the side-effects observed in this series into two groups: (1) those which were serious in the sense that they might endanger the patient's life; and (2) those which were merely inconvenient, aesthetically displeasing, or transitory.

Group 1. Side-effects Dangerous to Life

Depression.—The most serious reported complication of hormone treatment is psychosis. We have taken particular trouble in our series to exclude patients with psychological incidents in their history, and we have not encountered this complication. We have, however, one patient (Case 16) who suffers such severe depression on the minimal dose needed to control her arthritis that, although she has no family or previous history of psychological disturbances, we have decided to withdraw the drug.

Hypertension.—In all but three of our cases the blood pressure remained unaffected by treatment; in one (Case 19), however, hypertension became evident early in treatment and the blood pressure rose from 120/80 to 200/105 on the eighteenth day. The condition was symptomless, but, as it has so far proved impossible to find a dose which will control arthritis without further increasing the hypertension, cortisone is being withdrawn. In the other two cases the blood pressure rose slightly at the onset of treatment, but has not increased during the past year. Both these patients are working full time, and we have not felt it necessary to withdraw the hormone (Cases 2 and 15).

Gastric Complications.—There have been three gastric complications in the present series. Case 7 developed a duodenal ulcer after thirteen months on cortisone. This healed normally on medical treatment with slight reduction of the cortisone dosage whilst in hospital, and he has now been symptom-free for fifteen months. Case 4, who had a previous history of gastric ulcer, complained of retrosternal pain referred to the back. On investigation this was found to be due to an oesophagitis associated with a hiatus hernia, which responded to ordinary medical treatment with slight reduction in cortisone dosage. Continued medical treatment keeps her free from oesophageal pain. Case 12, after two years' continuous cortisone, complained of exhaustion, which was found to be due to anaemia secondary to melaena. On admission to hospital the haemoglobin had fallen to 4.23 g. Without alteration in the dose of cortisone she became symptom-free after transfusion and medical treatment. There was no *x*-ray evidence of peptic ulcer three weeks after the melaena stopped, but she has continued on an ulcer dietary regime.

Miscellaneous.—In the earlier cases, before the drug could be given by mouth, we encountered a great deal of trouble with injection abscesses. We have not encountered any intestinal intolerance to administration by the oral route. One case (No. 2), which has been reported fully elsewhere (Bishop and Glyn, 1952), has concurrent diabetes. He has been satisfactorily maintained on continuous cortisone therapy, however, whilst his diabetes has been controlled by insulin. We have already reported (Copeman *et al.*, 1952) the death from cerebral haemorrhage of one of our long-term patients. This was not, however, thought to be attributable to cortisone, and as she received the drug for only nine months her case is not included in the present series.

Group 2. Less Important Side-effects

Obesity.—The most common side-effect in female patients on cortisone has been a tendency to accumulate fat, both local and general. In nine cases there has been some rounding of the face; in two the development of localized

deposits of fat over the lower cervical vertebrae ("buffalo hump"), and in six cases some weight increase, due partly to fluid retention as evidenced by peripheral oedema, and partly to the voracious appetite which such patients occasionally develop. These effects were controlled with difficulty in some cases, by reduction of dosage, a salt-free diet, and fluid restriction.

Miscellaneous.—Minor skin abnormalities have occurred on high dosage: acne in three cases, excess sweating and hypertrichosis in two, and pigmentation in a single case. All these have disappeared on dose reduction. Minor psychiatric symptoms were occasionally noted, and were fairly evenly divided between those who showed apathy and exhaustion and those who complained of tension and irritation. In no case were they severe or disabling, and it seems that in such cases the drug merely tends to accentuate the normal personality trends.

Discussion

It is universally agreed that cortisone in adequate dosage will suppress the symptoms and signs of rheumatoid arthritis in a relatively short period, and it is recognized that when the drug is withdrawn a rapid relapse generally follows. It is, however, argued by some that because of this necessity for prolonged or even indefinite administration cortisone does not constitute practical therapy, and that owing to the danger of side-effects its use is not justified in practice.

Published reports of long-term treatment with cortisone and A.C.T.H. have now appeared from various parts of the world. Holbrook (1953), reporting on a group of 36 patients with rheumatoid arthritis treated with cortisone, found that at the end of twenty-four months only 10 of these were still getting worth-while improvement, and that all showed some clinical and *x*-ray advance in their disease. West and Newns (1953) reported a study of 27 patients with rheumatoid arthritis treated for an average of nineteen months with a maintenance dose between 50 and 75 mg. a day. They compared their series with other patients who had not received cortisone, and concluded that this drug does not have a favourable effect on the course of rheumatoid arthritis, and because of the danger of complications do not recommend its administration on a long-term basis.

In New York Freyberg *et al.* (1951) studied 44 patients who received cortisone uninterruptedly for more than a hundred days. In many patients a good partial remission could be maintained with 50–75 mg. daily. These authors none the less point out that prolonged use of cortisone is not practical treatment for all patients with rheumatoid arthritis. They advocate its use mainly for definite purposes, such as to check rapidly worsening disease or to facilitate certain stages in physical therapy or rehabilitation.

In Copenhagen Fischer and Brøchner-Mortensen (1953, 1954) have treated 50 patients suffering from rheumatoid arthritis with both cortisone and A.C.T.H. In their first report on 24 patients these authors were unwilling to commit themselves on the practicability of this form of treatment. In their second paper they report the study of 50 cases. In five cases treatment was abandoned because of an unsatisfactory response, whilst in another five cases complications necessitated stopping these drugs. In four cases treatment was stopped after five to twelve months because remission had occurred. The remaining 36 were maintained with an average dose of 69 mg. of cortisone a day from five to thirty-three months. Measurement of the joint-movement index and the general functional ability showed an improvement in 84% of the group when compared with the pretreatment values. Of the group in remission or continuing treatment only two had been capable of work before treatment started, compared with 31 during therapy; whilst the number of totally disabled subjects in this series was reduced from nine to one. Those authors now conclude, therefore, that this form of treatment is of practical value in the therapeutic management of selected cases of rheumatoid arthritis.

From Paris, Coste *et al.* (1953) reported 20 cases of rheumatoid arthritis treated continuously for many months. In three cases remissions occurred and they were able to stop treatment without relapse; in a further three cases the results were poor and cortisone was discontinued; whilst in the remaining 14 patients the results were satisfactory enough to make continued therapy worth while. Like most recent workers they preferred continuous to intermittent courses of treatment, and they believe that this method can be used as a practical therapeutic measure in this disease, save perhaps in early cases which might anyhow be expected to go into remission spontaneously. They estimated the risk of psychotic side-effects at 1% in their series.

Clark *et al.* (1953) reported on 35 patients with this disease treated with cortisone for from three to twenty-four months. Major subjective improvement was obtained in 74% and major objective improvement in 38%, although minor complications were common. They did not consider that hormone therapy should be employed until maximum benefit from conservative measures has been established, and that it should always be combined with such measures.

A study of long-term cortisone treatment was reported by Ward *et al.* (1953) in which 65 patients were treated. In 57 (88%) of these cortisone controlled the symptoms adequately, and in 8 (12%) the drug was stopped because the dose required for significant relief of symptoms also produced side-effects. In 46 patients the drug was given continuously for from eight to twenty-four months. In 44 of these patients there was moderate to great improvement; in the remaining two cases the relief was only mild. Nine cases showed mild side-effects. These authors concluded that long-term cortisone is a practical and useful method of treatment in rheumatoid arthritis, and is the treatment of choice in certain phases.

Conclusion

As the result of our experience with a well-observed group of 20 cases of rheumatoid arthritis, we consider that cortisone therapy is a practical addition to treatment in selected cases.

As cortisone is not actually curative, and since we have seen radiological progression of joint damage in patients in whom the symptoms were being suppressed, we consider that more conservative methods of treatment, such as adequate rest, salicylates, gold salts, and physiotherapy, should generally be tried first, as these will themselves in some cases produce adequate remission of the disease.

Absolute contraindications to cortisone therapy are recent or active tuberculosis, present or past psychosis or psychoneurosis, diabetes, hypertension, and severe osteoporosis; while long-standing cases with much permanent irreversible deformity and joint damage are also unsuitable for cortisone therapy.

Evidence is adduced to show that the functional improvement of the patient under cortisone treatment is greater than the actual degree of suppression of the activity of the disease. The most suitable cases are therefore those in which the functional disability exceeds the anatomical joint damage.

It is our experience that, although previously incapacitated, a number of patients can be restored to and maintained in relatively normal activity by long-term cortisone treatment. Such patients, however, require careful and constant supervision if this result is to be achieved.

Summary

Twenty cases of rheumatoid arthritis have been treated with cortisone; 14 of them received this drug for over two years.

All were previously incapacitated, but 17 have been able to return to their occupations with the help of this treatment, as the result of varying degrees of functional improvement, the extent and nature of which have been analysed.

The dosage and management of these cases, and the side-effects seen in the course of their treatment, are discussed.

The cortisone used in this study was partly provided from a generous gift made jointly to the Medical Research Council and the Nuffield Foundation by Messrs. Merck & Co. Inc., and partly from the Ministry of Health. We wish to acknowledge the valuable assistance given to us by Dr. B. Gottlieb, consultant physician, St. Mary Abbots Hospital, and his assistants, and by the following pathologists and biochemists and their assistants: Dr. H. E. Archer, Dr. J. D. Robertson, and Dr. R. G. L. Waller, West London Hospital; Dr. A. G. Signy, St. Mary Abbots Hospital; and Dr. A. E. Kellie, Middlesex Hospital.

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AN APPRECIATION OF MITRAL STENOSIS*

PART II. INVESTIGATIONS AND RESULTS

BY

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THE ELECTROCARDIOGRAM

P Mitrale

The P mitrale may be defined as a widened P wave of normal or only slightly increased voltage, usually notched, bifid, or flat-topped. It was present in all but four of the surgical cases with normal rhythm. The exceptions included three instances of the P pulmonale (due to extreme pulmonary hypertension in two and to tricuspid stenosis in one); there was only one instance in which the P wave was normal, and this was the mildest in the series. In 10 cases the auricular complex was a mixture of the P mitrale and the P pulmonale: the pulmonary vascular resistance was in the extreme grade in two of these, between 6 and 9 units in three of them, and relatively normal in three; tricuspid stenosis was responsible in the other two. The P mitrale was at least 0.12 second wide in 79% of the whole surgical group.

In the medical series with normal rhythm, the P mitrale was absent in three-quarters of the trivial cases of mitral stenosis and in 10% of the relatively mild cases in the sense that they were not severe enough to warrant valvotomy. It was present in all the cases in which mitral incompetence was associated with stenosis, although usually of only moderate degree; there was no presystolic murmur in 80% of these cases. A P pulmonale was present in the most extreme example of pulmonary hypertension and in two cases of tricuspid stenosis, but in only one other. Excluding the trivial cases, a well-developed P mitrale, at least 0.12 second in duration, occurred in half of all the medical cases with normal rhythm.

In the group with almost pure mitral incompetence the P wave was normal in all trivial and mild cases; it was present in relatively mild degree (0.10 to 0.11 second) in half of those of moderate grade. It was seen, also in relatively mild degree, in 80% of the severe cases (grade 3 or 4).

A conspicuous P mitrale (grade 3 or 4) could not be correlated with a dominant *a* wave in the left atrial pressure tracing: thus only one-third of the cases showing such *a* waves had a grade 3 or 4 P mitrale; conversely, only a similar proportion of cases having a conspicuous P mitrale had an *a* wave higher than *v* in the left atrial tracing. The grade of the P mitrale could not be correlated with the size of the left atrium, this fact being best illustrated by the relatively mild grades found in mitral incompetence, which favours left atrial dilatation. Nor could it be correlated closely with the size of the mitral orifice found at operation, the great majority of those with conspicuous P mitrales having an orifice either in the average grade (1 by 0.5 cm.) or in the slightly tighter grade (0.75 by 0.4 cm.).; in only one was the stenosis extreme (0.5 by 0.3 cm.).

It is concluded that the P mitrale is a good sign of well-developed mitral valve disease, and that if it is well marked (grade 3 or 4) it strongly favours stenosis rather than incompetence; also that it should be present in all cases of stenosis that are severe enough to warrant valvotomy.

Right Ventricular Preponderance

The degree of right ventricular preponderance in mitral stenosis based on a conventional interpretation of the six routine V chest leads was closely related to the pulmonary vascular resistance (Fig. 7). An important practical fact noticed in the analysis was that any degree of right ventricular preponderance in mitral stenosis meant that the case was severe enough to warrant valvotomy: the converse, of course, was not true.

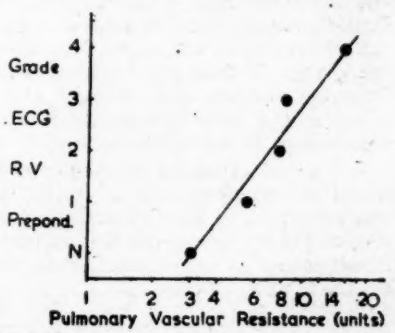

FIG. 7.—Relationship between right ventricular preponderance and pulmonary vascular resistance.

Left Ventricular Preponderance

Left ventricular preponderance was very rare in pure mitral stenosis, and when present was only of slight degree. In the mitral incompetent group, on the other hand, it occurred in 82%, excluding trivial cases, and in degree averaged slightly over grade 2. Grade 3 left ventricular preponderance always meant severe mitral incompetence in the absence of aortic valve disease. In the medical group with significant mitral incompetence, left ventricular preponderance, averaging a little under grade 2, occurred in one-third, ventricular balance being normal in half and

*The second part of a lecture delivered before the San Francisco Heart Association on October 29, 1953, and modified for the Strickland Goodall lecture of the Society of Apothecaries of London, March 24, 1954. Part I appeared in last week's issue (p. 1051).

the right ventricle predominating in the remainder. Amongst the surgical cases with combined mitral stenosis and incompetence, slight left ventricular preponderance (averaging grade 1) occurred in one-third, the ventricular balance being normal in one-third and the right ventricle preponderating in one-third.

It is concluded that left ventricular preponderance is excellent evidence of mitral incompetence in the absence of aortic valve disease. In the whole surgical series there was only one patient with more than slight left ventricular preponderance, and she did not do at all well. Since the results of valvotomy were poor in half the cases of mitral stenosis complicated by more than trivial incompetence, and only fair in another quarter, and since only one-third of this group had left ventricular preponderance at all, and that of only grade 1, it follows that higher grades of left ventricular preponderance are a direct contraindication to mitral valvotomy.

X-RAY APPEARANCES

Small Aorta

Diminution in the size of the aortic knuckle, often to the extent of its being invisible in the antero-posterior view, was noticed in two-thirds of the surgical cases. A normal aorta was attributed to concomitant aortic valve disease, to atherosclerosis associated with age (over 45), to a relatively mild degree of stenosis, or to the maintenance of a normal rather than a low cardiac output at rest (4.5 to 6 litres a minute), each of these factors occurring in 30%, sometimes in varying combination. Their respective incidences in the surgical cases with a small aorta were 7%, 12%, 19%, and 20%, so that aortic valve disease and age were more likely to have been responsible than the degree of stenosis and the measured cardiac output; few of the cases were mild enough for the last two factors to be important. In addition, 6% of those with a normal aorta had a slightly raised blood pressure (about 160/110) against 1% in those with a small aorta. No obvious cause for a normal-sized aorta could be found in 15%.

In the mitral incompetence group, omitting trivial cases and those of grade 1 severity, 50% had a normal aortic shadow, but of these 58% were between 45 and 69 years old. In the cases with a small aorta only 17% were in this age group. If these relatively old patients are also omitted from the analysis, two-thirds of the mitral incompetence group had a small aorta, which is more comparable to the findings in mitral stenosis.

In the medical series two-thirds of those with significant mitral incompetence had a normal aortic shadow. This was attributed to associated aortic valve disease in half of them. On the whole the findings did not implicate mitral incompetence as one of the factors which tend to preserve a normal aortic shadow.

Left Ventricular Enlargement

Radiological evidence of left ventricular enlargement in cases of mitral valve disease proved less reliable than either clinical or electrocardiographic evidence, and deserves no further comment.

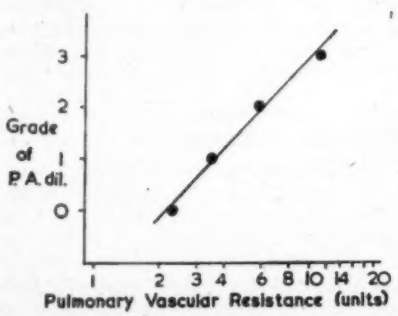

FIG. 8.—Relationship between size of pulmonary artery and pulmonary vascular resistance.

Dilatation of the Pulmonary Artery

There was a close relationship between the size of the pulmonary artery and the pulmonary vascular resistance (Fig. 8). The figures were compiled from the medical and surgical groups, omitting cases of pure mitral incompetence. When the pulmonary artery was normal or only slightly dilated the pulmonary vascular resistance was normal or only slightly increased in 95%, being high in only 5%; on the other hand, when the pulmonary artery was considerably or grossly dilated the resistance was normal or only slightly increased in 17%, whereas it was high or extreme in 83%. No doubt the correlation would have been closer still if there were not so much variation in the radiological appearances of the pulmonary artery in normal individuals.

In the group with pure mitral incompetence considerable dilatation of the pulmonary artery was seen in only one instance; the vessel was normal in 73%, slightly dilated in 21%, and moderately so in 4%. The lack of enlargement was attributed to the relatively low pulmonary vascular resistance found in this group (see below).

Dilatation of the Right Atrium and Ventricle

It was rarely possible to decide which of these chambers was chiefly affected radiologically, either in the antero-posterior or in the oblique positions, and they have therefore been taken together. The clinical and electrocardiographic findings usually make it clear whether or not the ventricle is involved. In any case, isolated dilatation of the right atrium is seen only in tricuspid stenosis.

The presence and degree of right-sided cardiac enlargement was closely related to the size of the pulmonary artery (and therefore to the pulmonary vascular resistance). Thus in the whole series the grading of the two was the same in 55% and within one grade of each other in 35%, being out of harmony in only 10%. In the surgical group, when there was any discrepancy it was usually the pulmonary artery that was relatively larger than the right side of the heart. In the medical group it was the other way round. When the pulmonary artery was conspicuously dilated and the right heart only slightly so, a high pulmonary vascular resistance was present in half the cases; no explanation could be found in the other half. When the shadow of the right side of the heart was conspicuously enlarged and the pulmonary artery normal or only slightly dilated, tricuspid stenosis was present in 44%, pericardial effusion in 12.5%, and "congestive heart failure" without an unduly high pulmonary vascular resistance in 25%; no explanation other than auricular fibrillation could be found for the remainder.

Left Atrial Dilatation

The size of the left atrium was graded so far as possible from the *x*-ray appearances in the antero-posterior view. When it could not be seen at all in this view, but deflected the oesophagus backwards in the first oblique position, enlargement was considered to be slight (grade 1); a similar grading was applied when the right border of the left atrium could be seen through the shadow of the right atrium but did not overlap it in the antero-posterior view. Grade 2 enlargement meant that the left border of the atrium or the appendage itself formed a separate arc between the shadows of the pulmonary artery and left ventricle, or that the right border of the left atrium formed the upper part of the right border of the heart, but did not extend further laterally than the right atrium; in grade 3 dilatation the left atrium bulged conspicuously on both sides of the heart, and extended beyond the shadow of the right atrium on that side; gross enlargement was reserved for aneurysmal dilatation.

The average size of the left atrium in the surgical group worked out at grade 1.62, for the medical 1.92, and for mitral incompetence 2.35; for the whole series it was grade 1.8. These figures confirm the fact that mitral incompetence is a more important cause of left atrial dilatation than mitral stenosis.

In the surgical group no correlation could be found between the size of the left atrium and the degree of stenosis. Omitting the cases complicated by significant

incompetence, grade 1 dilatation was found in 42%, grade 2 in 52%, and grade 3 in 6%; aneurysmal dilatation was not seen. The incidence of each grade of dilatation was much the same in each grade of stenosis. Similarly there was no correlation between the size of the left atrium and the left atrial pressure, provided that a critical degree of stenosis had been reached—as in the surgical group; those with grade 1 dilatation had an average left atrial pressure of 22.9 mm. Hg; those with grade 2 dilatation 21.8 mm. Hg.

In the medical group the size of the left atrium worked out at less than grade 1 for trivial cases, at grade 1.5 for the average case of stenosis not yet severe enough to warrant valvotomy or so severe that death supervened before operation could be undertaken, and grade 2.5 for combined stenosis and incompetence. This confirms the conclusion already drawn.

In the cases in which the pulmonary vascular resistance was extreme (10 units or above) the average size of the left atrium was a little under grade 1.5.

The relationship of the size of the left atrium both to auricular fibrillation and to systemic embolism has been discussed under those headings.

Pulmonary Venous Congestion

Pulmonary venous congestion is of course closely related to dyspnoea, but from time to time intense congestion may be noted radiologically in a patient who is hardly breathless at all, and vice versa. In these unusual cases individual idiosyncrasy in respect of the nervous reflex involved in the mechanism of this type of dyspnoea is inculpated.

As expected, the degree of pulmonary venous congestion judged radiologically was proportional to the left atrial pressure (Fig. 9). This chart shows that the vast majority of cases with radiological signs of pulmonary venous congestion had left atrial pressures between 10 and 30 mm. Hg.

Pulmonary venous congestion was also proportional to the degree of stenosis, provided the pulmonary vascular resistance was not too high. This is shown in Fig. 10, *a* to *d*, which have been compiled from the surgical cases without significant incompetence. When the mitral orifice was less

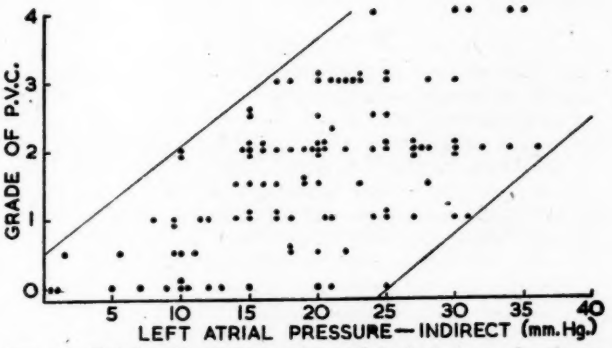

FIG. 9.—Relationship between the radiological signs of pulmonary venous congestion and the left atrial pressure.

stenosed than usual, venous congestion was slight or moderate in degree and was never modified by the pulmonary vascular resistance, for the latter was never raised; in the most common type of case, with an orifice of about 1 by 0.5 cm., congestion was usually moderate or considerable, provided the resistance was not above six units, but fell off sharply when the resistance was higher; when the mitral orifice was tighter than usual, around 0.75 by 0.4 cm., but not yet extreme, the findings were similar; in extreme cases in which the orifice did not exceed 0.5 by 0.3 cm., congestion tended to be considerable or gross and, although modified by resistances between 6 and 10 units, usually required a greater degree of vasoconstriction for its efficient

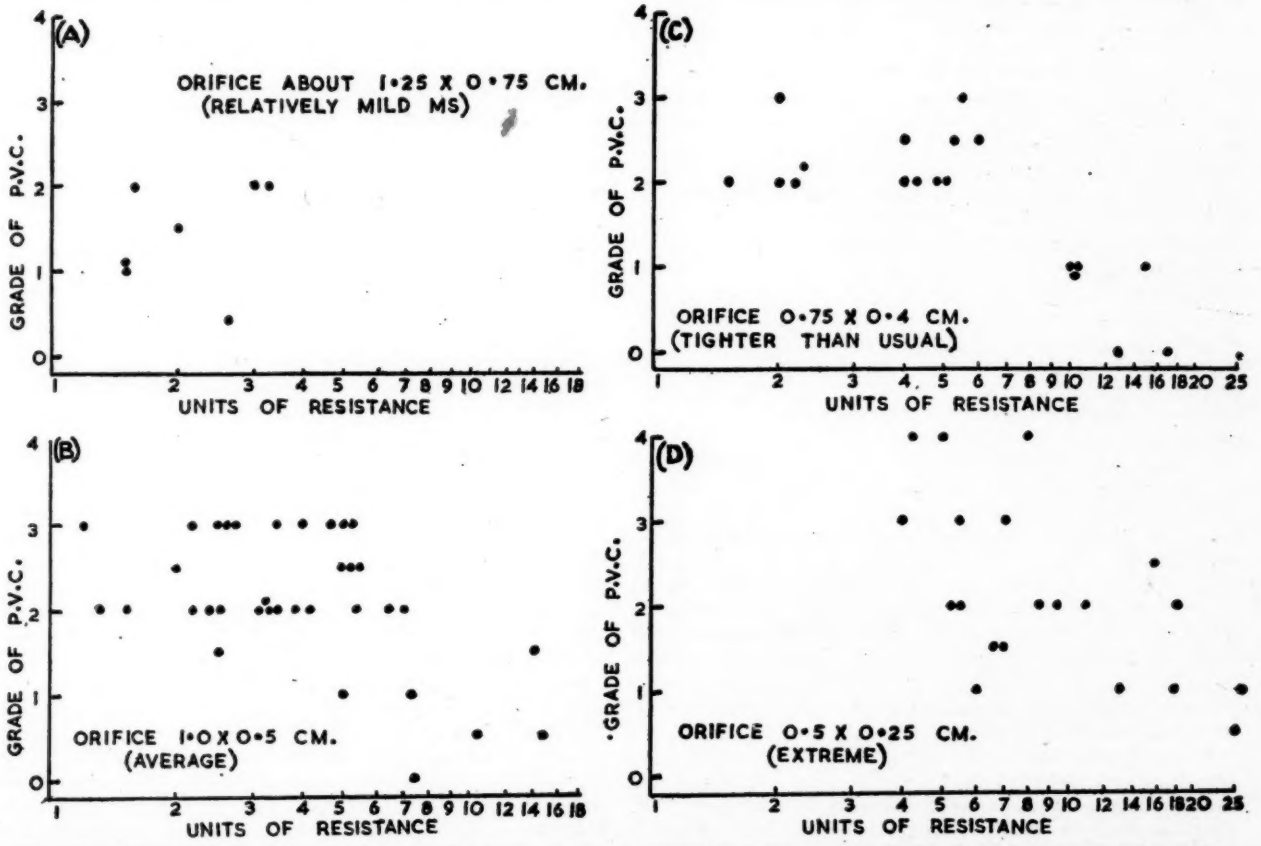
(A)
ORIFICE ABOUT 1·25 X 0·75 CM.
(RELATIVELY MILD MS)
(B)
ORIFICE 1·0 X 0·5 CM.
(AVERAGE)
(C)
ORIFICE 0·75 X 0·4 CM.
(TIGHTER THAN USUAL)
(D)
ORIFICE 0·5 X 0·25 CM.
(EXTREME)
GRADE OF P.V.C.
UNITS OF RESISTANCE
1 2 3 4 5 6 7 8 9 10 12 14 16 18
1 2 3 4 5 6 7 8 9 10 12 14 16 18 20 25

FIG. 10.—Relationship between the intensity of pulmonary venous congestion judged radiologically, the pulmonary vascular resistance, and size of the mitral orifice. In A the orifice was larger than usual, in B it was average, in C it was tighter than usual, and in D it was extreme. In B, C, and D the damping effect of a high resistance is seen.

relief. It may also be noticed from Fig. 10 that there was a higher incidence of cases with a high resistance in the group with extreme stenosis than in the other groups; life may well have depended on it.

Good objective evidence of a functionally successful valvotomy was afforded by relief of pulmonary venous congestion judged by radiological standards.

Haemosiderosis

Incontrovertible haemosiderosis, distinct from pulmonary venous and lymphatic congestion, was observed in 10% of the surgical cases and in 6% of the medical; it did not occur in a single instance of pure mitral incompetence. In the few examples in which serial skiagrams had been taken over a prolonged period haemosiderosis had been present for many years; indeed, the time of its onset was never detected, for it was always present in the first film obtained and did not change subsequently either before or after operation.

Orthopnoea or paroxysmal cardiac dyspnoea occurred in 60% of the cases with haemosiderosis, which is about the same as its incidence in the combined surgical and medical groups as a whole, so that pulmonary venous congestion cannot be the only factor concerned. Normal rhythm and a normal pulmonary vascular resistance were each present in 80% of the cases with haemosiderosis, which is a little higher than in those without. But by far the most important factor correlated with haemosiderosis was *pulmonary apoplexy*, as previously defined, for this had occurred in 55%, which is four to five times higher than its incidence in cases without haemosiderosis (12%). Since haemosiderosis is believed to be due to multiple recurrent haemorrhages from the broncho-pulmonary anastomoses in the mucosa of the terminal bronchioles the relationship was expected (Laubry *et al.*, 1948; Lendrum, 1950).

No correlation could be established between haemosiderosis and mitral incompetence, the left atrial pressure, or the size of the mitral orifice; nor, of course, had it anything to do with pulmonary hypertension.

Calcification of the Mitral Valve

The association between heavy calcification of the mitral valve and a serious degree of mitral incompetence has been emphasized repeatedly, and the point is strongly confirmed in the present series. Thus, 40% of the group with relatively pure well-developed mitral incompetence, 52% of the medical cases of mitral stenosis complicated by serious incompetence, and 62% of similar surgical cases had heavy calcification; in fact, 50% of all cases with a significant degree of mitral incompetence had heavy calcification.

In the surgical group 28% of all cases had some degree of mitral calcification, but it was trivial and in no way influenced the findings, operative technique, or results in over half of them; only 12% of the surgical cases had heavy or moderate mitral calcification, and significant incompetence was present in all but three of them.

Valvotomy was undertaken in these cases because the patients' symptoms were attributed to stenosis despite the leak, or in the hope that the valve could be repaired. The results in this small series were never excellent; they were good in 41%, fair in 12%, and poor in 47%. The chief cause of the bad results was the development of an even greater degree of mitral incompetence. Of three cases in which the pre-operative mitral leak was trivial, two did badly in this way.

In the medical group as a whole 87.5% of those with mitral calcification had moderate or considerable mitral incompetence.

It is concluded that heavy mitral calcification is a serious drawback to valvotomy, not only because it favours too great a degree of mitral incompetence, but because it is likely to result in such incompetence if not already present. It is not merely the calcium which causes the trouble, but the severe destruction of the valve mechanism which leads to its deposition.

Cardio-Thoracic Ratio

Although this was measured and recorded in most cases, it has not been analysed separately, for an increased cardio-thoracic ratio meant little unless the dilated chambers causing the enlargement of the heart shadow were identified. When there appeared to be true general enlargement without a mechanical cause, pericardial effusion proved a more likely explanation than active rheumatic carditis.

CATHETER STUDIES

Cardiac catheterization was carried out in 125 of the surgical cases, 42 of the medical, 17 of those with mitral incompetence, and in 23 awaiting valvotomy—a total of 207 cases. No serious technical difficulty was encountered in any of them; there was no mortality, and no complications other than the occurrence of pulmonary infarction when diodone was injected through a catheter wedged in a distal branch of the pulmonary artery, so that that method of studying the anatomy of the pulmonary circulation had to be abandoned.

Right Atrial Pressure

Tracings obtained from the right atrium confirmed clinical observations on the jugular venous pressure and pulse described under that heading. Little further information was gained by analysing the central tracings themselves. When there was normal rhythm *a* and *v* were usually about equal in amplitude in uncomplicated cases. The *a* wave was usually dominant, measuring 3 to 5 mm. Hg above *v*, in cases with severe pulmonary hypertension, and was occasionally of giant proportions. Giant *a* waves were also recorded in tricuspid stenosis. In advanced heart failure the *v* wave became more prominent and was followed by a steep *y* descent. In tricuspid incompetence the *x* descent was minimal, and in auricular fibrillation it was never seen.

Right Ventricular Pressure

The systolic pressure was of course always the same as the pulmonary artery systolic pressure; this is discussed in the next section. The right ventricular pressure at the end of diastole was raised in 50% of patients with congestive heart failure, lying between 4 and 14 mm. Hg above the sternal angle; that the other 50% with failure did not show high readings was attributed to the fact that patients with heart failure were commonly treated by means of rest, digitalis, a low-sodium diet, and mercurial diuretics, and were not catheterized until they had improved. For this reason few of the figures represent the situation in severe failure.

The right ventricular end diastolic pressure was not raised in tricuspid stenosis. The diagnostic pressure gradient across the tricuspid valve in this condition has already been described and illustrated (Fig. 5, in Part I).

Pulmonary Artery Pressure

In the surgical group the pulmonary artery pressure averaged 64/33, with a mean of 45 mm. Hg. It will be noted that the diastolic level averaged about half the systolic, and that the mean pressure averaged the diastolic plus two-fifths of the pulse pressure. The pulmonary systolic pressure was 100 to 130 mm. Hg in 13%, between 60 and 95 mm. Hg in 40%, between 50 and 59 mm. Hg in 22%, and below 55 mm. Hg in 27%.

The relationship between the pulmonary systolic pressure and the pulmonary vascular resistance in the combined surgical and medical series is shown in Fig. 11. The critical systolic levels were 100 mm. Hg, above which the resistance was always raised, and 50 mm. Hg, below which the resistance was very rarely raised. The resistance varied considerably, however, when the pulmonary systolic pressure lay between 50 and 100 mm. Hg. Nearly all patients with pressures below 100 mg. Hg and an extreme pulmonary vascular resistance had congestive heart failure.

The relationship between the pulmonary pressure gradient (mean P.A.P. – mean L.A.P.) and the pulmonary vascular resistance is shown in Fig. 12. The critical gradient was about 25 mm. Hg, above which practically all cases had a resistance over 6 units. The majority of patients with

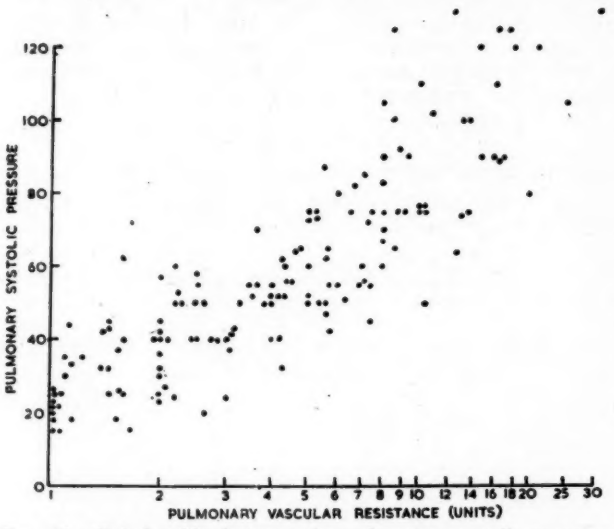

FIG. 11.—Relationship between the pulmonary systolic pressure and the pulmonary vascular resistance.

resistances between 6 and 10 units had gradients between 20 and 30. Practically all cases with an extreme resistance (10 to 30 units) had pressure gradients between 30 and 70 mm. Hg.

The pulmonary artery pressure always rose during effort, often very considerably. When the resistance was relatively normal the rise in pressure tended to run parallel with a rise in left atrial pressure, and in some instances the latter reached unexpectedly high levels, well above 35 mm. Hg. Clinical pulmonary oedema did not develop in these cases, but the effort was maintained for only three minutes. When the resistance was high the pulmonary artery pressure tended to rise disproportionately, often to an extreme degree. Precise figures cannot be given, because neither the work done nor the cardiac output during effort was measured, and unless these factors are known the findings can do no more than indicate the general trend. Since Dexter and his group (Gorlin *et al.*, 1951) showed that the resistance did not in fact change during effort, we have abandoned the test as a diagnostic procedure, for it did not seem to provide any information beyond that already obtained in other ways.

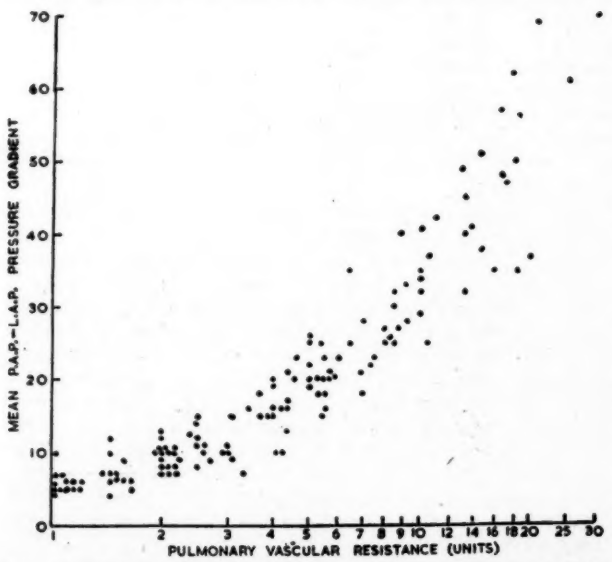

FIG. 12.—Relationship between the pulmonary pressure gradient and the pulmonary vascular resistance.

Left Atrial Pressure

This was measured indirectly by wedging the catheter in a distal pulmonary artery as described in the introduction under "Method" in Part I. Tracings were considered valid only when venous in form.

The left atrial pressure ranged between 0 and 10 mm. Hg in all the trivial and several of the mild cases in the medical group, but was under 10 mm. Hg in only one of the surgical cases. This man had no effort intolerance, but was operated on for recurrent systemic embolism. The valve orifice was found to be less stenosed than usual.

The average left atrial pressure in the surgical group was 22.5 mm. Hg above the sternal angle, and, as previously mentioned, tended to be only slightly if at all higher in patients with orthopnoea or paroxysmal cardiac dyspnoea than in those without such symptoms; this also applied to patients giving a history of pulmonary oedema (Table IV). The relationship between the left atrial pressure and pulmonary venous congestion judged radiologically has already been discussed and illustrated in Fig. 9.

Pulmonary oedema was a rare complication of cardiac catheterization, and no physiological observations were made during an attack. On two occasions it occurred before the catheter was introduced into the vein. It is clear, however, that left atrial pressures up to 35 mm. Hg with reference to the sternal angle might be tolerated without pulmonary oedema, and that much higher pressures, even up to 50 mm. Hg, were maintained for short periods during the effort test without distress. On the other hand, pulmonary oedema never occurred with a left atrial pressure below 30 mm. Hg at the time, which agrees with the observations of Dexter's group (Gorlin *et al.*, 1951), and with current theory.

The relationship between the left atrial pressure and the pulmonary vascular resistance is shown in Table XVII. It

TABLE XVII.—*Left Atrial Pressure and Resistance*

	Pulmonary Vascular Resistance Units				
	Mild Medical Under 4	Surgical Series			
		Under 4	4–5·9	6–9·9	10–30
Average left atrial pressure (mm. Hg)	9·2	19·6	22·2	23·2	22·4

may be seen that there was some correlation between these two factors up to resistances in the critical range of 6 to 9.9 units, but when the resistance was in the extreme range (10 to 30 units) the left atrial pressure tended to fall off.

The left atrial pressure, as expected, was related both to the size of the mitral orifice and to the cardiac output, as shown in Fig. 13. The ratio C.O./L.A.P. offered a useful index of the degree of mitral stenosis, averaging 45% (range 33 to 66%) when the stenosis was less tight than average, 20% (range 12.5 to 50%) when the stenosis was average or a little tighter than average, and 12.5% (range 10 to 15%) when the stenosis was extreme, as previously defined. Gorlin's formula (Lewis *et al.*, 1952) could not be utilized, because the heart rate was omitted from the analyses.

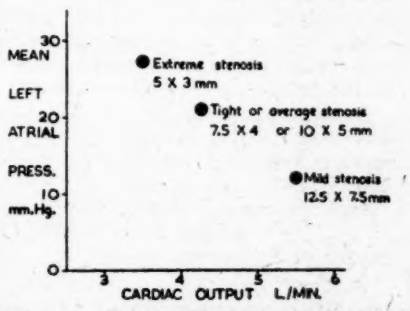

FIG. 13.—Relationship between left atrial pressure, cardiac output, and size of mitral orifice.

Form of the Left Atrial Pressure Tracing

The form of the pulmonary venous pulse has already been discussed in relation to the P mitrale of the electrocardiogram. Only 32% of all cases with reliable indirect left atrial pressure tracings showed *a* waves higher than *v*; *a* and *v* were about equal in amplitude in 39%, and *v* was taller than *a* in 29%.

Giant *a* waves towering more than 5 mm. Hg above *v* were uncommon. In this respect left atrial behaviour is different from right atrial behaviour in tricuspid stenosis. This rather unexpected finding requires further study.

Although *v* was taller than *a* in nearly one-third of the cases of pure mitral stenosis, the difference was usually only a matter of 2 to 4 mm. Hg. In mitral incompetence with normal rhythm, on the other hand, *v* towered above *a*, the average difference in well-developed cases being as much as 14 mm. Hg, the range being 5 to 25. The expression giant *v* wave would not be out of place in these cases. When there was auricular fibrillation the amplitude of the *v* wave in mitral stenosis infrequently exceeded 10 mm. Hg and averaged nearer 5 mm. Hg; in well-developed mitral incompetence, on the other hand, it ranged between 5 and 30 mm. Hg. Thus, although there was considerable overlapping, it is fair to say that a *v* wave over 15 mm. Hg in amplitude nearly always means mitral incompetence, and a *v* wave under 5 mm. Hg nearly always excludes it.

Arterial Oxygen Saturation

The arterial oxygen saturation averaged 91.5% for the whole surgical series, being within the normal range (92 to 96%) for our laboratories in 52%, slightly reduced (88 to 91%) in 34%, and moderately reduced (83 to 87%) in 14%.

An attempt was made to find some factor common to the cases with the lowest range of arterial oxygen saturation. Pulmonary venous congestion could not be inculpated when patients with paroxysmal cardiac dyspnoea were compared with patients without orthopnoea, but appeared to be a significant factor in the group with orthopnoea only (Table XVIII). This suggests that patients with orthopnoea only

TABLE XVIII.—*Relationship Between Arterial O_2 Saturation and Symptoms of Pulmonary Venous Congestion*

	Arterial Oxygen Saturation		
	92–96%	88–91%	83–87%
No orthopnoea or P.C.D. ..	58%	31%	11%
Paroxysmal cardiac dyspnoea ..	52%	36%	12%
Orthopnoea only	38%	35%	27%

may be more advanced than patients with paroxysmal cardiac dyspnoea (a hypothesis which is not as improbable as it might seem), or that the factor chiefly responsible for a low arterial oxygen saturation tends to prevent paroxysmal cardiac dyspnoea: such a factor might well be the pulmonary vascular resistance.

In the small group of cases in which the arterial oxygen saturation ranged between 83 and 87% the pulmonary vascular resistance was extreme in 46%, between 8 and 9 units in 39%, and normal in 15%; in these last instances pulmonary oedema was present at the time. Conversely, 35% of all cases with an extreme resistance had an arterial oxygen saturation under 88%.

In the group with the lowest arterial oxygen saturation the left atrial pressure averaged 22.5 mm. Hg, which is the same as in the rest of the series. The cardiac output averaged 3.3 litres a minute and was below 4 litres a minute in all but one instance. The low cardiac output was probably the result of the high resistance.

Coincidental cor pulmonale, due to emphysema, the result of repeated attacks of winter bronchitis, was a very rare complication of mitral stenosis, as previously mentioned, and certainly played no part in lowering the arterial oxygen saturation in the cases analysed; in the most florid instance, in which independent bronchial asthma was believed to be at least partly responsible for the symptoms, the arterial oxygen saturation was 94%.

Just why a high pulmonary vascular resistance should reduce the arterial oxygen saturation is unknown. The same phenomenon occurs in the later stages of primary pulmonary hypertension. That frank pulmonary oedema lowers the arterial oxygen saturation is well known and requires no explanation; pulmonary venous congestion alone is exonerated.

Arteriovenous Oxygen Difference and Cardiac Output

The relationship between the arteriovenous oxygen difference and the cardiac output in the present series is shown in Table XIX and is illustrated in the shape of a curve in Fig. 14. If for any reason the oxygen consumption cannot be measured at the time the samples are obtained, it may be as accurate or more accurate to estimate the output from the arteriovenous oxygen difference by reference to such a curve than to measure the oxygen consumption subsequently.

TABLE XIX.—*Arteriovenous Oxygen Difference*

A-V Difference (ml./litre)	Incidence	Average Cardiac Output (l./min.)	Range (l./min.)
21– 30	1·5%	9·3	7·3–11·3
31– 40	6·5%	6·2	4·5– 7·8
41– 50	18%	4·8	3·7– 5·7
51– 60	30%	4·0	2·7– 5·5
61– 70	15%	3·4	2·5– 5·25
71– 80	17%	3·2	2·4– 5·0
81– 90	5·5%	3·0	2·2– 4·0
91–100	3·5%	2·9	2·5– 3·7
101–110	3%	2·3	2·0– 3·1

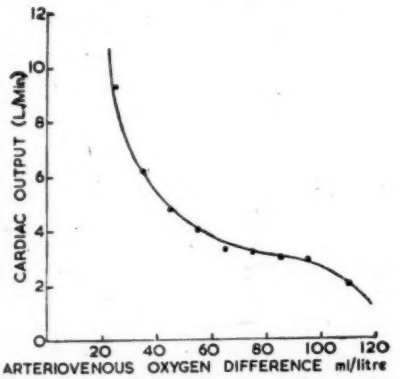

FIG. 14.—Relationship between the cardiac output and the arteriovenous oxygen difference.

The cardiac output averaged 3.8 litres a minute in the surgical cases, being higher in those with normal rhythm (4.1) than in those with auricular fibrillation (3.6), and higher in those with paroxysmal cardiac dyspnoea (4.0) and pulmonary oedema (4.6) than in those without (3.5 in the group also without orthopnoea); it was especially low (3.3) in cases with the typical mitral facies, and was above average (4.2) when there was no peripheral cyanosis at all.

The relationship between the cardiac output and the pulmonary vascular resistance is shown in Fig. 15. The pulmonary resistance is perhaps the most important of all the factors limiting the cardiac output. Certainly the output is restricted by the mitral stenosis itself, but if the resistance did not rise there would be little to prevent the output being maintained at the expense of an extremely high left atrial pressure, which would result in death from pulmonary oedema. This state of affairs has in fact been observed, although death was prevented by prompt treatment. Surges of output in pregnancy, during effort, on excitement, and as the result of other factors in patients with normal resistance may cause paroxysmal cardiac dyspnoea or pulmonary oedema in this way. Such patients may have no orthopnoea under basal conditions; indeed, one of these dramatic attacks may be the first symptom of mitral valve disease in certain circumstances.

The cardiac output was of course low in patients with congestive failure, but this group also had a high pulmonary vascular resistance; nevertheless, it was probably lower in those with failure than in those without, but precise figures are not available because catheterization was usually deferred until congestive failure had responded to treatment.

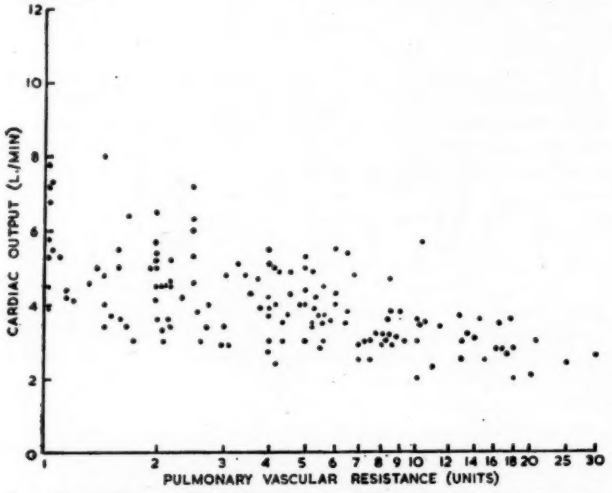

FIG. 15.—Relationship between the cardiac output and the pulmonary vascular resistance.

Pulmonary Vascular Resistance

Adapting the Poiseuille equation—

Resistance (R)=

$$\frac{\text{mean P.A. pressure} - \text{mean L.A. pressure (mm. Hg)}}{\text{pulmonary blood flow (cardiac output in l./min.)}}$$

the result may be expressed in units as in this paper. If it is desired to express resistance in fundamental units of force, as described by Gorlin and Gorlin (1951), pressures in mm. Hg must be converted into dynes/cm.^{2}, and flows expressed in litres a minute must be converted into cm.^{3}/sec. The equation thus becomes—

$$R = U \times \frac{0.1 \times 13.59 \times 981.17 \text{ dynes/cm.}^2}{1{,}000 \text{ cm.}^3/60 \text{ sec.}}$$

where U stands for the simple unit already described. The figure 13.59 is the specific gravity of mercury, and 981.17 cm. per second per second is the g factor—that is, the acceleration force of gravity. The dividend thus becomes 1,333.4 dynes/cm.^{2} The equation may now be rewritten—

$$R = U \times \frac{1{,}333.4 \text{ dynes} \times 60 \text{ sec.}}{1{,}000 \text{ cm.}^5}$$

$$= U \times 80.004 \text{ dynes sec./cm.}^5$$

Thus it is only necessary to multiply the unit by 80 to express the resistance in dynes sec./cm.^{5}

In the 200 cases in which it was measured the pulmonary vascular resistance averaged 6 units for the surgical group, 4.2 units for the medical, and 3.5 for those with mitral incompetence, or 5.4 for the whole series. Further details are given in Tables XX and XXI. The estimates for the whole series were contrived by including the 100 cases that were not catheterized, arbitrarily giving to each the average resistance of the group to which it belonged on clinical and other grounds. This was desirable because high-resistance cases were more likely to have been selected for physiological investigation than the others.

TABLE XX.—*Pulmonary Vascular Resistance*

	Average Resistance (Units)	Incidence of Each Grade of Resistance			
		Normal 1–3·9 Units	Transitional 4–5·9 Units	High 6–9·9 Units	Extreme 10–30 Units
Surgical ..	6·0	38·4%	26%	23%	12·6%
Medical ..	4·2	63%	15%	12%	10%
Mitral incompetence ..	3·5	56%	31%	6·5%	6·5%
Total catheterized ..	5·4	45%	24%	19·5%	11·5%
Estimate for whole series ..	4·2	60%	20%	12%	8%

TABLE XXI

	Pulmonary Resistance		
	"Normal" 1–5·9 Units	High 6–9·9 Units	Extreme 10–30 Units
M.S. serious	64%	19%	17%
,, all cases	73%	14%	13%
,, *M.I.* serious ..	74%	26%	—
,, ,, all cases ..	79%	21%	—
M.I. serious	84%	13%	3%
,, all cases	90%	8%	2%

It may be added that predictions concerning resistances were rarely far wrong once the principles outlined in this paper were understood.

Although high resistances were rare in pure mitral incompetence they were not uncommon in combined lesions; extreme resistances, however, were very rare in anything but pure stenosis (Table XXI).

The behaviour of the pulmonary vascular resistance is perhaps the most important physiological event in mitral stenosis, and to a large extent determines the course and pattern of the disease. Thus a high resistance puts a considerable strain on the right ventricle and causes that chamber to enlarge with or without functional tricuspid incompetence; it prevents the pulmonary venous system and left atrium from developing unduly high pressures and so diminishes orthopnoea and abolishes paroxysmal cardiac dyspnoea and pulmonary oedema; it limits the cardiac output directly and also indirectly by tending to reduce the pressure gradient across the mitral orifice. In other words, a high pulmonary vascular resistance saves the patient from drowning at the expense of a low cardiac output; a high venous pressure, hepatic distension, oedema, and fatigue replace haemoptysis, severe breathlessness, paroxysmal cardiac dyspnoea, and pulmonary oedema. Most of the evidence upon which these conclusions are based has already been presented in previous sections. It remains to be shown that congestive heart failure itself occurs only as a result of a high pulmonary resistance. That this was so in mitral stenosis is clear from Fig. 16. This omits

FIG. 16.—Relationship between congestive heart failure and the pulmonary vascular resistance. •=Mitral valve disease without failure. ●=Congestive failure in mitral stenosis. O=Congestive failure in mitral incompetence. *=Failure due to thyrotoxicosis.

transient congestive failure provoked by auricular fibrillation with uncontrolled ventricular tachycardia. There was no single instance in which a primary myocardial fault was responsible for failure. In mitral incompetence, on the other hand, there were as many cases of heart failure with relatively normal resistances as with high, and either a myocardial fault or some other factor must have operated. This question needs further study.

It might be thought that a high resistance developed in mitral stenosis gradually over the years in all well-established cases and that it depended on structural changes in the pulmonary arteries resulting from passive pulmonary hypertension secondary to a rise in left atrial pressure; that it was an inevitable end-result which must occur sooner or later if the patient did not die prematurely from pulmonary oedema, systemic embolism, or other complication of mitral stenosis. This hypothesis was not supported

by the facts. On the contrary, the average age of the group with an extremely high pulmonary vascular resistance was the same as in the rest of the series, as already mentioned; indeed, in the whole series the three most florid examples of extreme pulmonary hypertension were aged 27, 23, and 27. Again, no case of irreversible pulmonary hypertension has yet been encountered, and there is good reason to believe that the pulmonary vascular resistance falls after technically successful mitral valvotomy in practically all these cases, even if the operation is undertaken only in the very last stages and in the presence of gross heart failure. Finally, only 20% of the really high-resistance cases gave a previous history of pulmonary congestive symptoms, the great majority presenting the clinical picture of active pulmonary hypertension from the start. Just what determines this vasoconstrictive response is unknown. Much the same problem is encountered in cor pulmonale and the Eisenmenger syndrome (Wood, 1952).

Operative Findings

These have already been correlated with the pre-operative findings, and will therefore be reviewed here only briefly.

1. *Atrial Thrombosis.*—A clot was found in the left atrial appendage or sometimes in the left atrium itself in 23% of cases, as described in the section on systemic embolism, to which its relationship has been fully discussed. Brock has stressed the importance of allowing blood to gush momentarily from the incised auricle when a clot is detected or suspected, with the object of washing it out, and this manœuvre has been successful in a number of cases (Baker *et al.*, 1952). Even so, systemic embolism complicated valvotomy in 10%.

2. *Mitral Incompetence.*—A regurgitant jet was appreciated by the surgeon in 24%, being slight in just over half of them, moderate in nearly a quarter, and considerable in nearly a quarter. Some degree of incompetence was predicted in 90% of these cases, as a rule with reasonable accuracy in respect of degree. Thus the prediction was correct in all but one of those with considerable regurgitation; in fact, half of them had been put up for surgical repair rather than valvotomy. Some were put up for valvotomy at a time when an attempt was being made to see what could be done for combined stenosis and incompetence, usually at the repeated request of the patient. The results were uniformly poor or fair; the degree of mitral incompetence was never less after the operation, and as a rule it was worse. Nevertheless, one-third of these patients improved enough to have made valvotomy worth while, and from being totally incapacitated they were comfortable and able to get about, though scarcely well enough to work.

Of the cases in which a moderate regurgitant jet was found, one had been predicted to have considerable incompetence and two mild incompetence—the rest were accurately assessed. Of those with a small jet, a trivial degree of incompetence had been predicted in 72%, the leak had been overlooked in 17%, and a moderate leak had been diagnosed in 11%.

Mitral incompetence of trivial degree was diagnosed clinically in 9% of the series, apparently in error. In one-third of this small group—that is, in 3% of the whole series—it was expected to be moderate in degree; but no instance of serious mitral incompetence was predicted erroneously. The final results in those with trivial or moderate leaks were not quite as good as in the rest of the series, there being fewer graded as excellent, and in over one-third of them mitral incompetence became considerable in degree.

Calcium.—Mitral-valve calcification has already been discussed in the radiological section. Only trivial calcification was sometimes overlooked on screening, important calcification practically never.

Size of Orifice

The orifice was commonly described as a small oval 1 by 0.5 cm. (Brock, 1952); it was about this size in 46% of the surgical cases, but was tighter (0.75 by 0.4 cm. approximately) in 18%, and extremely stenosed (0.5 by 0.3 cm. approximately) in 21%; in only 5% was the orifice a little larger, and it never exceeded 1.5 cm. in length in cases of simple stenosis. When there was a serious degree of associated mitral incompetence the orifice usually measured from 1.25 to 2 cm. by 0.75 to 1 cm. in length. In these cases the valve was severely disorganized and commonly heavily calcified, as described by Brock (1952). There were too few cases of pure incompetence examined to form any opinion about those.

The relationship between the size of the orifice and the symptoms, physical signs, and physiological findings has been discussed in other sections. It need only be said here that extreme stenosis tended to have more dire consequences than an average-sized opening, and that the grade of stricture should not be considered less important than the physiological reaction to the obstruction. Certainly pulmonary oedema was just as likely to occur in a patient with an average or relatively large orifice (provided it was within the critical range) as with extreme stenosis; auricular fibrillation, haemoptysis, and systemic embolism were also indifferent to the size of the orifice; but the pulmonary vascular resistance was undoubtedly influenced by the degree of stenosis, never being raised with a relatively large orifice, and never being normal with extreme stenosis (Fig. 10, *a–d*); angina pectoris, the left atrial pressure, the degree of pulmonary venous congestion, and the cardiac output all bore an inverse relationship to the size of the orifice. The matter may be summed up by stating that the degree of stenosis was the fundamental factor which determined the severity of the disease, and pulmonary vasoconstriction was the most important physiological reaction which modified its course and behaviour; auricular fibrillation and embolism were in the nature of accidents.

Post-operative Course

Shock from the operation, intrathoracic haemorrhage, pleural effusion, collapse of the lung, and left chest pain, having no bearing on the present thesis and being purely surgical matters, are not discussed.

Post-operative Auricular Fibrillation.—Auricular fibrillation occurred post-operatively in 24% of the surgical cases, usually during the first week. It tended to last about ten days in those cases in which normal rhythm was resumed spontaneously, but if left to nature it was often permanent. At first we attempted to prevent the rhythm change by means of quinidine, but this failed; it was found much better to prepare the patient with digitalis, so that the ventricular rate was controlled when auricular fibrillation developed. We also learned that it was a mistake to try to restore normal rhythm too soon, the reversion being more easily accomplished towards the end of the second week. Since it is now believed that only fresh clots are responsible for embolism, anticoagulants are begun on the seventh day, so that no clot is likely to form in the left atrium during the five days before quinidine is given. Normal rhythm was restored in this manner and without embolic complications in 95% of the cases in which quinidine was used (Table XXII). Post-operative auricular fibrillation was left alone when the surgeon had found clots in

TABLE XXII

	Incidence (%)		Functional Results (%)			
	Total	In Each Group	Excellent	Good	Fair	Poor
Normal rhythm throughout ..	31·3		56	33	9	2
Post-op. A. Fib.	24					
Spontaneous reversion ..		21	100		0	0
Quinidine " ..		59	40	55	0	5
" failed		3	100		0	0
Permanent A.F., no quinidine		17	50			50
Pre-op. A.Fib.	38					
Spontaneous reversion ..		0				
Quinidine " ..		10	80		20	0
" failed		10	80		20	0
Permanent A.F., no quinidine		80	12	37	33	18
Died	6·6					

the left atrium, or when valvotomy was not technically satisfactory. Quinidine was also given to a limited number of patients whose auricular fibrillation had been present before the operation if conditions for restoring normal rhythm seemed favourable. The results in this small group were far less satisfactory, however; for normal rhythm was restored in only half of them, and of these two-fifths relapsed.

Fever and Left Chest Pain.—Recurrent attacks of fever, usually associated with pain in the left chest, lasting about one week and with intervals up to a month, occurred in 10%. For a long time the cause of these attacks was by no means clear. The course of each was uninfluenced by antibiotics and salicylates, and it was soon realized that both fever and pain abated just as quickly when no special treatment was given. No rheumatic manifestations accompanied the fever. Reference of pain to the left neck and flank, occasional pericardial friction or effusion, and certain electrocardiographic changes suggested pericarditis, and it is now believed that this is the usual explanation. The attacks closely resembled those seen in association with pericardial foreign body (Wood, 1950). No serious consequences have ever been observed, and in the end they have always subsided permanently.

Psychosis.—Confusional psychiatric states, usually with delusions, during the immediate post-operative course occurred in 5% of cases. The disturbance was always temporary, however, and normal mental function was restored within a matter of weeks. There was no evidence of cerebral embolism in these cases, but the exact mechanism is unknown.

Results

Results were assessed in terms of function and were excellent in 30%, good in 40%, fair in 15%, poor in 9%, and fatal in 6%. *Excellent* meant that effort intolerance became normal or improved by three grades. For example, the result was classed as excellent if a patient who was totally incapacitated before the operation had only slight effort intolerance three months afterwards. A good result meant that effort intolerance improved by two grades and a fair result by one grade. Good results were also characterized by abolition of paroxysmal dyspnoea, orthopnoea, haemoptysis, angina pectoris, peripheral embolism, and serious winter bronchitis in all cases.

The chief causes of indifferent or bad results were inadequate splitting of the commissures or mitral incompetence (either pre-operative or as a direct consequence of the valvotomy). The chief surgical complication which sometimes spoiled an otherwise good result was systemic embolism.

During the three-year period under review 5% of the cases have re-stenosed, including 3 out of the first 20. Since mitral stenosis takes from three to fifteen years to develop after active rheumatic valvulitis, a similar time interval must elapse before the true incidence of re-stenosis is known.

SUMMARY

All cases of mitral valve disease may be grouped according to the anatomical lesion or the physiological state; in certain circumstances the former is more useful, in others the latter. In practice, a combination of the two has been found best. In respect of anatomy one is concerned whether mitral stenosis or mitral incompetence is dominant and with the degree of obstruction or leak; also with the presence and degree of associated aortic valve disease or tricuspid stenosis. Physiologically, the most important factor is the pulmonary vascular resistance. In the present series the cases have been grouped according to the anatomical lesion and its severity when the resistance was normal or borderline; but when the resistance was high or extreme the cases were grouped separately and subdivided into those with dominant stenosis and those with dominant incompetence, for the degree of valve damage was never trivial or mild in these cases. The incidence of each group and subgroup is set out in Table XXIII.

TABLE XXIII.—*Chief Groups*

	Pure M.S.			M.S. Trivial M.I.			M.S. Serious M.I.			Pure M.I.			High Pul. Resistance		Gross Pul. Resistance		Mitral and Aortic	Mitral and Tricuspid
	Trivial	Rel. Mild	Serious	Trivial	Rel. Mild	Serious	Trivial	Rel. Mild	Serious	Trivial	Rel. Mild	Serious	Dom. M.S.	Dom. M.I.	Dom. M.S.	Dom. M.I.		
Surgical	—	—	70	—	—	10	—	—	12	—	—	2	22	6	18	—	5	5
Medical	6	27	2	2	8	—	2	7	16	—	—	—	2	4	4	—	12	5
Mitral incompetence	—	—	—	—	—	—	—	—	—	7	14	24	—	4	—	1	—	—
Total	6	27	72	2	8	10	2	7	28	7	14	26	24	14	22	1	17	10
Incidence %	2	9	24	0·6	2·6	3·3	0·6	2·3	9·3	2·3	4·6	8·6	8	4·6	7·3	0·3	5·6	3·3
Incidence % discounting severity	35			6·6			12·3			15·6			12·6		7·6		5·6	3·3
Chief groups	41·6						28						20·3				Others 10	

1. Pure Mitral Stenosis (35%)

The clinical features of pure mitral stenosis may now be described as follows.

The patient is usually a woman in the mid-thirties. The chief symptom is breathlessness rapidly progressing to paroxysmal cardiac dyspnoea, orthopnoea, and sometimes death from acute pulmonary oedema. Blood-spitting is frequently associated with congestive attacks, and these are often complicated by winter bronchitis. Pulmonary apoplexy may be an early symptom. Pregnancy aggravates the symptoms and usually causes some permanent deterioration.

On examination she looks well, and although the hands may be cold there is little peripheral cyanosis and the mitral facies is commonly absent. The peripheral pulse is small and firm, the jugular venous pressure and pulse are normal. The left ventricle cannot be felt at the apex of the heart; there is only a slight lift, if any, over the right ventricle in the left parasternal line, and none over the pulmonary artery. In the mildest cases a presystolic murmur and an accentuated first heart sound are the only auscultatory signs, but an opening snap soon develops. In better-developed cases which are still free from symptoms all the classical auscultatory signs are invariably present. At the apex of the heart these consist of a presystolic murmur, a loud slapping first sound, no systolic murmur, a soft aortic second sound, a loud opening snap, no third heart sound, and a long mitral diastolic murmur of moderate intensity, often accompanied by a thrill. The tap imparted to the palpating hand represents the first heart sound. At the base the second heart sound is normally split, and the second or pulmonary element is only slightly if at all accentuated. There is no pulmonary incompetence. In the third left space it is often possible to hear the pulmonary component of the

second sound separating out on inspiration, and the opening snap increasing in intensity during expiration.

The electrocardiogram shows a normal P wave in trivial cases and a P mitrale in better-developed cases, certainly in all those requiring valvotomy. The QRS–T complexes are normal.

X-ray films show a small aorta, a normal or only slightly dilated pulmonary artery, slight or sometimes moderate dilatation of the left atrium, normal ventricles and right atrium, and a varying degree of pulmonary venous congestion, according to the severity of the case, being absent in mild cases and gross in the most severe. Haemosiderosis may be present in cases giving a history of pulmonary apoplexy. No calcification can be seen in the mitral valve, or if present it is only slight. The cardiothoracic ratio is under 50%.

On cardiac catheterization the right atrial pressure and wave form are normal. The right ventricular diastolic pressure is normal. The mean pulmonary artery pressure is commonly 10 to 15 mm. Hg above the left atrial pressure, which is normal in trivial cases, still under 10 in mild cases, and between 15 and 30 in the great majority requiring valvotomy. On exertion the left atrial pressure rises considerably, sometimes well above 35 mm. Hg, and the pulmonary artery pressure rises passively. Whether or not pulmonary vasoconstriction develops during an attack of pulmonary oedema is still uncertain. Such a reflex would certainly be expected as a result of the anoxia and would be a physiological life-saving event. The arterial oxygen saturation is normal unless there is pulmonary oedema. The arteriovenous oxygen difference is well below 50 ml. per litre in mild cases and commonly between 50 and 60 in those requiring valvotomy. The cardiac output is normal or only slightly reduced at rest; it rises normally in mild cases, but is strictly limited in the more severe; nevertheless, it is by no means fixed. The pulmonary vascular resistance is normal or near normal. At operation in cases severe enough to warrant it, the left atrium is usually free from clot, there is no calcium in the mitral valve and there is no mitral incompetence. The mitral orifice commonly measures 10 by 5 mm., but may be a little tighter (8 by 4 mm.) or even extreme (5 by 3 mm.); it is occasionally less stenosed, but is never more than 15 by 5 mm. as estimated by R. C. Brock (1952). Necropsy figures are usually higher. The cusps themselves are usually mobile, but the margins of the orifice may be fibrous and tough.

Mitral valvotomy is advised in all cases of pure stenosis with grade 2B to grade 4 effort intolerance, the results of a technically successful operation being excellent. Premature valvotomy should be avoided in view of the operative risks and the chance of re-stenosis (probably greater than at present envisaged).

2. Mitral Stenosis with Trivial Incompetence (6.6%)

This small group differs in no way from that just described except for the presence of a slight-to-moderate mitral systolic murmur, and a small regurgitant jet appreciated at operation.

3. Mitral Stenosis with Serious Incompetence (12.3%)

The patient is as likely to be a man as a woman. The symptoms are similar to those described for group 1, but pulmonary apoplexy is more likely to have occurred. The physical signs are very different. The peripheral pulse is small, but slightly water-hammer in quality. Auricular fibrillation is highly probable. The cardiac impulse is left ventricular in type and hyperdynamic. On auscultation there is no presystolic murmur even in those with normal rhythm, the first heart sound is soft, normal, or only slightly accentuated, there is a loud mitral systolic murmur usually associated with a thrill, no opening snap, a loud third heart sound, and a mitral diastolic murmur of moderate intensity and duration. The electrocardiogram usually shows left ventricular preponderance. The *x*-ray appearances are characterized by considerable or gross dilatation of the left atrium, enlargement of the left ventricle, and conspicuous calcification of the mitral valve; haemosiderosis may be seen in cases giving a past history of pulmonary apoplexy. The cardio-thoracic ratio is usually much increased owing to the dilated left heart.

The physiological findings are similar to those of pure stenosis except that the left atrial pressure tends to swing more and the arterial tracing may show systolic collapse.

At operation a powerful regurgitant jet can nearly always be felt. The valve is heavily calcified and disorganized, and usually measures about 15 to 20 by 5 to 10 mm. If it is sufficiently stenosed to encourage the surgeon to undertake simple valvotomy the degree of incompetence usually increases, and, although the patient is occasionally improved, he is usually no better off. Partial valvotomy may be more rewarding than a radical bilateral split. Combined stenosis and incompetence really requires a repair operation, but the techniques employed to date are none too satisfactory, and the results are indifferent. At the time of writing, therefore, it is wise to defer such cases, if not too advanced, in the belief that surgical techniques will continue to improve. If life is already threatened, however, conservative or partial valvotomy may be the best solution.

4. Pure Mitral Incompetence (15.6%)

The patient is usually a man. The symptoms are similar to those of pure mitral stenosis except that the downhill course is more rapid once breathlessness has developed. There is often, however, a longer latent interval which may compensate for the more rapid course. On examination the physical signs are similar to those of the combined lesion described in group 3, except that the mitral diastolic murmur is very short or absent altogether, and the gap between the systolic murmur and the third sound may be partly closed. The electrocardiographic and *x*-ray appearances are also similar to those in the combined lesion, but occasionally the left ventricle dominates the whole picture in a manner never seen when stenosis is present. Conspicuous systolic expansion of the left atrium, particularly in the antero-posterior view, is a valuable sign of organic mitral incompetence. The physiological findings are similar to those of the combined lesion, and in some the swing of the *v* wave in the left atrial pressure pulse is gross.

A repair operation is required. This may be undertaken at the present time if it is too dangerous to wait (Logan and Turner, 1952), but should be deferred in the majority of cases until the surgical technique is more satisfactory.

5. Mitral Valve Disease Complicated by a High Pulmonary Vascular Resistance (12.6%)

In this group the symptoms are much the same as in simple stenosis, the degree of pulmonary vasoconstriction being insufficient to prevent the development of high pulmonary venous pressures, but in some of the cases the symptoms of pulmonary venous congestion are damped. In a sense it is a transitional group between those with relatively normal resistances and those in the extreme grade.

There is more obvious peripheral cyanosis and the mitral facies may be present. The peripheral pulse is very small, and the jugular venous pressure may be a little raised; in some cases there is frank congestive heart failure or functional tricuspid incompetence, which are not seen in cases of stenosis with normal resistance. The left ventricle cannot be felt at the apex of the heart unless there is marked mitral incompetence as well; but there is nearly always a strong lift over the right ventricle. The auscultatory signs may be slightly damped, but as a rule are scarcely changed, except that the pulmonary element of the second sound is clearly accentuated. The electrocardiogram shows right ventricular preponderance, but the P wave is still mitrale in type. *X*-ray films show enlargement of the pulmonary artery and right side of the heart in addition to the appearances already described in the other groups.

Cardiac catheterization reveals a higher mean pulmonary artery pressure and a pressure gradient between 20 and 30 mm. Hg; the cardiac output tends to be lower and more fixed, the arterio-venous difference between 60 and 70 ml. per litre, and the pulmonary vascular resistance between 6 and 10 units. At operation the pulmonary artery is seen to be bulging and tense and the right-sided enlargement is confirmed. After technically successful valvotomy there is nothing to prevent an excellent result, and the pulmonary resistance is expected to return to normal.

6. Mitral Stenosis Complicated by an Extreme Pulmonary Vascular Resistance (7.6%)

It is very unusual for gross resistance to develop in cases of mitral incompetence or combined stenosis and incompetence. The patient is more likely to be a woman than in any other group. Although there is still breathlessness on exertion, and even slight orthopnoea in some cases, paroxysmal cardiac dyspnoea and pulmonary oedema do not occur and breathlessness is overshadowed by fatigue and oedema; ascites and angina pectoris are relatively common. Symptoms from pulmonary venous congestion are replaced by those related to a low cardiac output. It is this group, above all, that develops functional tricuspid incompetence and congestive heart failure. Haemoptysis due to pulmonary infarction occurs late in the course; indeed, death from pulmonary embolism secondary to phlebothrombosis in the legs is a constant danger.

The patient has either a conspicuous mitral facies and intense peripheral vasoconstriction, or, rarely, the palmar flush and vasodilatation of hepatic dysfunction. The peripheral pulse is exceptionally small. The jugular venous pressure is usually raised and the venous pulse may show a giant *a* wave in cases with normal rhythm. The left ventricle is always impalpable, but the heaving thrust over the right ventricle may extend as far across as the anterior axillary line. There may be pulsation over the pulmonary artery, but it is uncommon. The auscultatory signs are thoroughly damped. A presystolic murmur, if present, is difficult to hear. The first heart sound, however, is still accentuated. A loud systolic murmur may sometimes be heard at the apex of the heart, but it is tricuspid in origin and can be heard equally well at the left sternal edge. The opening snap may be inaudible, but in such cases may sometimes be demonstrated by means of phonocardiography. There may be a right ventricular third heart sound, which in association with the systolic murmur already mentioned may encourage a mistaken diagnosis of mitral incompetence. The mitral diastolic murmur may be abolished altogether or it may be heard only very occasionally and then only with great difficulty. In other cases the auscultatory signs of mitral stenosis are still obvious, but they are never florid. At the left sternal edge in addition to the tricuspid systolic murmur there may be a loud pulmonary systolic click synchronous with the opening of the pulmonary valve, as described by Leatham (1954). At the base the pulmonary component of the second sound is short, sharp, high-pitched, and loud, but may be difficult to separate from the aortic element even on inspiration. When there is pulmonary incompetence, which is common, the pulmonary second sound loses its characteristic quality.

The electrocardiogram shows either a P pulmonale or a combination of this and the P mitrale. There is usually gross right ventricular preponderance, high-voltage R waves and inverted T waves extending across from V_1 to V_3 or V_4, and no Q waves can be seen in V_6, for the right ventricle usually forms the apex beat.

X-ray films reveal a very small aortic knuckle, considerable or gross dilatation of the pulmonary artery, and marked enlargement of the right ventricle and atrium. The left atrium may not be obviously dilated in the antero-posterior view, but can usually be distinguished in the first oblique position. Pulmonary venous congestion may be absent altogether, the pulmonary vascular markings being chiefly arterial proximally, and very light distally, as described by Goodwin *et al.* (1952). The cardio-thoracic ratio is much increased owing to the right-sided enlargement.

The physiological findings are characterized by a prominent *a* wave in the right atrial tracing when there is normal rhythm, a raised right atrial and right ventricular end diastolic pressure, a pulmonary artery pressure in the region of 100/50 mm. Hg or above, a pulmonary pressure gradient well over 30 mm. Hg, and only an average rise in left atrial pressure. The arterial oxygen saturation is a little reduced in about one-third of the cases, the arteriovenous oxygen difference very high, and the cardiac output low and fixed. The pulmonary vascular resistance is between 10 and 30 units.

After a technically successful valvotomy the right ventricle may remain in difficulties for many weeks or months, and convalescence must be slow. There is good reason to believe, however, that the resistance falls gradually over the months and the whole situation may be very much improved a year afterwards.

7. Associated Aortic Valve Disease (5.6%)

When this is trivial it does not alter any of the clinical syndromes described. When it is severe it dominates the picture and need not be considered here. The cases which make up the group under discussion are those in which it is often difficult to decide whether the aortic or the mitral lesion is the more important.

The symptomatology and course are like that of mitral valve disease. The physical signs are thoroughly complicated, particularly when there is both aortic and mitral stenosis and incompetence, which is as likely as not. The mitral lesion tends to damp the signs of the aortic. When the pulmonary vascular resistance is raised in addition, the confusion is even greater and it becomes almost impossible to know which lesion is mainly responsible for the physiological changes in the circulation. It must suffice here to say that if aortic valve disease is not obviously the chief lesion, either it is of no importance or mitral disease is more advanced than suspected.

When aortic valvotomy or aortic valve repair can be more successfully undertaken these cases will have to be worked out with greater precision. At the moment the results of mitral valvotomy and attempted aortic valvotomy are indifferent, although sometimes good enough to have made the operation worth while.

8. Tricuspid Stenosis (3.3%)

Just as mitral stenosis damps the features of aortic valve disease, so does tricuspid stenosis damp those of mitral valve disease. These cases present with clinical features resembling those of the extreme pulmonary hypertensive group, but on examination, although the giant *a* is present in the neck, there is no lift over the right ventricle and no accentuation of the pulmonary second sound; similarly, the electrocardiogram reveals a tall P pulmonale, but little right ventricular preponderance, and radiologically, although the right side of the heart is distended, the pulmonary artery is not. Careful auscultation usually reveals separate tricuspid murmurs which are louder during inspiration. The diagnosis is made with certainty by demonstrating a pressure gradient of several mm. Hg across the tricuspid valve during diastole.

When tricuspid stenosis is severe mitral valvotomy cannot be recommended. But in relatively mild cases, in which the symptoms are due to mitral stenosis, the operation has been very successful. Tricuspid valvotomy is in its infancy.

Conclusion

Three hundred cases of mitral valve disease have been studied in detail. It is hoped that the facts revealed may be of some value to those interested in this fascinating subject.

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HORMONE TREATMENT OF DISSEMINATED BREAST CANCER

BY

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In the endeavour to control malignant disease, clinical and experimental work is being carried out to find substances which will inactivate cancer or reverse the cancerous changes back to normal. There is evidence that by alterations brought about in the hormonal status of the body by various methods the cancerous process in certain patients can be checked, thus enabling them to live on for a number of years in excellent health. By this means a form of treatment is being developed which may enable us to attain our object, and ultimately it seems likely that hormone therapy will play an important part in those cancers which are hormonal-dependent. At present new methods are required for biological assays of hormones to provide us with scientific measurements of the changes which are brought about by various stages of cancer and the effects of hormonal treatment. We could thus measure the hormonal balance of the body and abnormal amounts of particular hormones, and determine the constitution of abnormal hormones which may be present. Treatment to-day is largely empirical, based upon clinical observations, and further advances will be made in our search for the truth when the laboratory comes to our aid in this way.

The presence of disseminated breast cancer creates a serious situation for the patient and a difficult problem for the surgeon. Until recent years the prospect was gloomy, but now a little gleam of light is showing. A number of workers have demonstrated that some of these patients are sensitive to variations of their sex hormones; for regression in the disease has occurred with oophorectomy, adrenalectomy, and the administration of either androgens or oestrogens. This important therapeutic progress is not reviewed here; the object of this paper is to record the effects in a group of patients and especially to call attention to those patients who are living in excellent health more than four years later. The case record of the first patient has already been published (Raven, 1950); her subsequent history is now reported.

Case 1

A married woman aged 50 was seen on April 13, 1948, with disseminated carcinoma of the left breast. She stated that the various lumps became bigger just before her menstrual periods. A carcinoma 3.5 cm. in diameter was present in the upper inner quadrant of the left breast, with enlarged cervical and left axillary lymph nodes, the latter being fixed. Numerous skin deposits were present in the region of the left shoulder, left arm, chest wall, and right loin. A nodular lump 3.4 by 2.2 cm. was present in the right pre-auricular region. Histological examination of a cervical lymph node and a skin nodule showed spheroidal-cell carcinoma.

I performed a bilateral oophorectomy on July 7, 1948. The disease gradually disappeared, and on February 22, 1949, I found no evidence of cancer. The 17-ketosteroids in the urine were normal in January, 1950. In January, 1951, I excised a group of enlarged right axillary lymph nodes. Histological examination showed nodes replaced by sheets and cords of closely packed anaplastic polyhedral carcinoma cells. On January 8, 1952, an enlarged right supraclavicular lymph node and two small skin nodules in the posterior aspect of the chest were found; the patient was given methyltestosterone, 50 mg. daily, and these lumps regressed. The testosterone was withdrawn on July 28, 1953. Radiological examination of the chest and cervical, dorsal, and lumbar parts of the spine and pelvis was always negative for metastases. On December 22 I found a cyst 4 cm. in diameter in the left breast, and there was no clinical evidence of cancer anywhere. The patient is well, lives a normal life, and I think she looks younger than before, with colour in her cheeks: she volunteered the information that the latter was new for her, as she was always pale before the treatment. The amount of hair on her face has now decreased markedly, but her voice remains at a lower pitch than normal.

Case 2

A married woman aged 42, without children, noticed a lump in the right breast in November, 1946. This was removed elsewhere in February, 1948, and histological examination showed a carcinoma. A week later I performed a right radical mastectomy. In May, 1949, radiological examination showed metastases in the ribs, pelvic bones, right femur, and probably in the neck of the left femur. Palliative high-voltage *x*-irradiation was given to relieve the pain they were causing, and she was also given methyltestosterone, 50 mg. daily, until September, 1950. There was marked reduction in the pain in the right hip and improvement in the pain in her back. In March, 1951, she looked and felt very well; hot flushes occurred after the testosterone was withdrawn. Flexion was slightly limited at the right hip, otherwise movements in both hips were full. Testosterone therapy was recommenced and the dose increased to 75 mg. daily by April, 1952; it was withdrawn in May, 1952. At this time palliative *x*-irradiation was given to the right hip. In June, 1952, pain occurred in the right shoulder and there was radiological evidence of a metastasis in the upper part of the shaft of the right humerus; palliative *x*-irradiation was given to this region.

On October 20, 1953, methyltestosterone, 25 mg. daily, was given because radiological examination of the pelvic bones showed that the affected areas were bigger and an increase had occurred in the area of rarefaction in the right

humerus. I examined the patient on December 22 and found her in excellent health and living a normal life; there was no evidence of soft-tissue metastases; the radiological appearances of the osseous metastases persist. There is very little hair on the face; her voice has a lower pitch than normal.

Case 3

A married woman aged 60, with one child, noticed a lump in the left breast in November, 1951, and in February, 1952, a left radical mastectomy was performed elsewhere for a carcinoma, and followed by a course of high-voltage *x*-irradiation.

She was brought to hospital by ambulance on December 16, 1952. On examination she looked ill, cyanosed, and dyspnoeic. There were no clinical signs of local recurrence; metastases in the chest were suspected. Radiological examination of the chest showed some elevation of the left diaphragm, the trachea was displaced to the left, and there were enlarged hilar shadows on both sides and an opacity in the left upper zone of the lung which resembled lymphogenous spread of carcinoma. The patient was treated with testosterone phenylpropionate, 50 mg. twice weekly. Examination on March 24, 1953, showed that she had improved and was gaining weight. The testosterone injections were increased to 100 mg. twice a week. On June 23, the improvement was maintained; her voice was lower in pitch, and the testosterone injections were decreased to 50 mg. twice weekly. On November 24 the patient stated that she felt well; the testosterone injections were continued, and thyroid extract, ½ gr. (32 mg.) twice daily, was prescribed. A radiological examination of the chest showed that the opacity in the left mid-zone was more clearly defined. When examined on December 22 she looked well, no dyspnoea or cough was present, her general condition was good, and there was no evidence of soft-tissue metastases.

Case 4

A married woman aged 56 first attended hospital on August 14, 1941, with a rodent ulcer involving the external canthus of the right eye, which was treated with low-voltage *x*-irradiation. On October 21, 1952, she complained of a lump in the left breast, and on examination it was found that the nipple was retracted and a carcinoma was present in the upper and inner quadrant, attached to the skin and deep fascia. The left axillary nodes were palpable. Radiological examination showed metastases in several right lower ribs, in the bodies of the eleventh and twelfth dorsal and the lumbar vertebrae, and also in the neck of the left femur. Injections of testosterone phenylpropionate, 50 mg. weekly, were given for four months. In March, 1953, she complained of pain in the lumbar spine; the injections of testosterone were stopped and ethinyl oestradiol, 0.05 mg., was given twice daily. In May a palliative course of high-voltage *x*-irradiation to the lumbar spine was given and the ethinyl oestradiol was continued.

On October 13 the patient was examined; she had no pain in her back and only a small area of residual thickening remained in the left breast; no lymph nodes were palpable in the left axilla. Radiological examination showed extensive osseous metastases in the spine, pelvis, and neck of the left femur. A follow-up letter dated December 18 stated that her condition remained the same.

Case 5

A married woman aged 49, with two children, attended hospital in August, 1953, with multiple skin nodules of carcinoma; the first of these had appeared six months previously. Thirteen years ago a hysterectomy for a fibroid uterus and excision of the right ovary for a cystadenoma had been performed elsewhere. In 1947 a left radical mastectomy was performed elsewhere for a carcinoma of the breast, proved by microscopical examination, and in 1952 a right radical mastectomy was done elsewhere for a carcinoma of the breast, proved by microscopical examination. A course of *x*-irradiation was given after each operation.

On examination irradiation changes were seen in the left supraclavicular region; there were multiple skin nodules over a wide area, including the right chest wall, left hypochondrium, left iliac fossa, and the right arm. Radiological examination of the dorsal spine showed no evidence of metastases. Injections of testosterone phenylpropionate, 50 mg. twice weekly, were given. Examination on October 27, 1953, showed considerable regression in the skin nodules.

Case 6

A married woman aged 80, without children, attended hospital in April, 1949, with a lump in the left breast which had been present for nine years. It had been increasing in size slowly and had bled during the past two months. Three months after the lump appeared in the breast another lump developed in the left axilla. On examination an ulcerating carcinoma 7.5 by 6 cm. occupied the inner half of the left breast attached to the chest wall, and the nipple was destroyed. A hard lymph node 1.5 cm. in diameter was present in the left axilla attached to the skin. Radiological examination of the chest showed no metastases. A course of high-voltage *x*-irradiation was given to the left breast, left axilla, and left supraclavicular regions. On September 16, 1952, the ulcerating carcinoma and axillary lymph node was still present and the patient was treated with stilboestrol (5 mg., thrice daily) until November 20, when vaginal bleeding occurred and the stilboestrol was withdrawn. By December 20 the ulcerating carcinoma had almost healed. On October 13, 1953, it was seen that the lesion had regressed considerably, was dry and practically healed, and no abnormality was present in the left axilla. From April 21 she has had ethinyl oestradiol, 0.05 mg. twice daily. On January 12, 1954, the lesion was flat and healed.

A summary of results in the above cases is given in the accompanying Table.

Results of Hormone Treatment in Disseminated Breast Cancer

Case	Variety of Disease	Treatment	Survival Period after First Treatment Given	Survival Period after Start of Hormone Treatment
1	Carcinoma breast; cervical and bilateral axillary lymph node metastases; multiple skin nodules	Oophorectomy; excision right axillary lymph nodes. Methyltestosterone	5½ years	5½ years
2	Carcinoma breast; multiple osseous metastases	Radical mastectomy. H.V.T. (palliative). Methyltestosterone	6 „	4½ „
3	Carcinoma breast; pulmonary metastases	Radical mastectomy. Post-op. H.V.T. Testosterone phenylpropionate	2 „	1 year
4	Carcinoma breast; multiple osseous metastases	Testosterone phenylpropionate. Ethinyl oestradiol. H.V.T. (palliative)	1½ „	1½ years
5	Carcinoma breasts rt. and lt.; multiple skin nodules	Radical mastectomy rt. and lt. Post-op. H.V.T. Testosterone phenylpropionate	7 „	2 months
6	Ulcerating carcinoma breast; axillary metastases	H.V.T. Stilboestrol	4½ „	1½ years

Discussion

Each patient received benefit from hormone therapy with androgens or oestrogens, and Cases 1 and 2 are of special interest because they are in excellent health 5½ and 4½ years respectively later. In the first patient there is no evidence of carcinoma; in the second there is radiological evidence of bone metastases, but this is not adversely affecting the

patient's health. The voices of both patients are lower in pitch, but there is no other evidence of masculinization. The amount of hair on the face in Case 1 has diminished considerably and she has a much more youthful appearance than before the oophorectomy. The other patients will be followed up for a longer period to assess the results. If patients are enabled to live on in comfort for several years in spite of persistent cancer the value of this treatment will be established, and it is likely that some method will be found to counteract any unpleasant side-effects which may occur.

Since Loeser (1940) suggested testosterone therapy for advanced breast carcinoma several reports have described the effects in soft and osseous tissue dissemination. Additional information is now required on survival periods after this treatment is begun. More than 50 years have gone since Beatson (1896, 1902) wrote of the beneficial effect of oophorectomy in some of these patients, and it has received sporadic attention to the present time. This operation is also being performed in the younger pre-menopausal group of patients after radical mastectomy, and it is necessary to evaluate the end-results after the lapse of an adequate follow-up period.

Regarding the dosage of testosterone, I usually give a big dose during the first course of treatment, which in one patient has extended for 18 months. A careful check is kept on the patient's general condition, including examinations of the blood urea and serum calcium. An important observation is the improvement which occurs after the cessation of hormone treatment, and it is suggested that these interruptions play an important part. When they have obtained the maximum benefit from oophorectomy and androgen therapy there are certain patients with severe pain from osseous metastases who may be helped further by adrenalectomy. The selection of patients for this final form of treatment must be done carefully, and at present it seems that the number suitable for it is small.

Summary

The results of hormone therapy in a group of patients with disseminated breast cancer are described and attention is called to two patients who are in excellent health 5½ and 4¾ years later.

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The Minister of Health is to be asked to receive a deputation from the London County Council on the question of the extension of chiropody services provided by the Council under the National Health Service. In the county of London facilities are provided at the rate of 1.38 chiropodist sessions per 10,000 population, but there is no provision in the City of London and in 13 other metropolitan boroughs. The Health Committee of the Council states that the inadequate and unbalanced service is due to the diversity of the arrangements taken over in 1948. They regard chiropody as essentially a preventive service, which could do much to prevent the ill-health resulting from foot trouble, and urge that an extension of the service is a logical development of the functions of the local health authority under the N.H.S. Act. The approval of the Minister was sought for a long-term scheme of extension of the service as a whole by 34%, and a short-term scheme for an immediate extension of the service in those boroughs without any service at all at present. All the clinics would be in existing or projected health service premises. The Minister replied that while appreciating the Council's concern in the matter he did not feel able to approve either of the schemes. Accordingly he is to be asked to receive a deputation.

ACUTE POST-OPERATIVE LARYNGEAL OBSTRUCTION

BY

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Though large series of post-anaesthetic conditions have been reported from time to time, we have found little reference to lesions of the upper respiratory tract. Obstructions of various bronchi by mucus plugs giving rise to segmental and sometimes massive collapse of the lung are well known, but the more serious obstruction at the larynx is notably absent from the literature. Four cases of this grave complication occurring after grafting operations in children are presented.

Case 1

A girl aged 3 years was admitted to the burns unit with a history of having fallen into boiling water six weeks previously. Her general condition was poor and she had obviously lost weight. On examination an extensive granulating area involving her abdomen, back, and both lower limbs was found.

On the afternoon of the third day a grafting operation was performed under general anaesthesia induced with cyclopropane and oxygen and maintained with methyl N-propyl ether ("neothyl") and oxygen. A No. 1 "flexometallic" endotracheal tube was passed without difficulty and the operation was uneventful, though the defect was not fully grafted owing to its extent.

Shortly before midnight on the same night very slight stridor was noted, but was not regarded as significant. Next morning the stridor was more pronounced and was accompanied by a moist cough, but there was no other evidence of laryngeal obstruction. Treatment consisted of steam tent, postural drainage, and systemic penicillin. At midday she vomited after a bout of coughing and the larynx went into spasm, but this subsided on careful toilet of the pharynx by suction. Some time after this episode her breathing became more laboured and there was indrawing of the suprasternal notch. This became more pronounced during bouts of coughing in her effort to clear the air passages of a tenacious sputum. At 4.45 p.m. an acute airway obstruction developed, followed by cyanosis, coma, and convulsions. The latter was localized to the right side of the face and the left side of the body.

An emergency tracheotomy was performed and aspiration of the air passage carried out, with considerable improvement in her colour. On cutting down the dressings on her abdomen to ensure unrestricted respirations an acute dilatation of the stomach was uncovered. This was thought to be due to sucking air into the oesophagus during the airway obstruction, and was deflated with a stomach tube.

Her general condition was still very poor and severe convulsions continued. An intravenous drip was set up and the convulsions were controlled with gallamine triethiodide ("flaxedil"). An initial dosage of 12.5 mg. of gallamine followed by 7.5 mg. within a few minutes sufficed to control this attack. A dosage of 2.5 mg. half-hourly was maintained, but convulsions recurred eight hours later. These subsided only after the administration of 50 mg. of gallamine in divided doses, and 12.5 mg. was given on any

further evidence of twitching. From then on a steady recovery was maintained and a pyrexia of 102° F. (38.9° C.) subsided in a few days.

The tracheotomy tube was removed on the sixth day and grafting was subsequently completed. Her second operation, which was carried out without endotracheal anaesthesia, was uneventful.

Case 2

A girl aged 3 years was admitted with deep burns of the left side of the chest, abdomen, and left arm, which were sustained when her clothes caught fire. She was in good general condition.

Two weeks after admission a grafting operation was done. General anaesthesia was induced with cyclopropane and maintained with neothyl, nitrous oxide, and oxygen. A No. 1 flexometallic endotracheal tube was passed without difficulty. Operation was uneventful and the grafting completed. In the immediate post-operative period she was described as being "chesty," but there was no evidence of any airway obstruction.

Six hours later a mild degree of stridor was noted, and during the night it increased. It continued during the first post-operative day, and was accompanied by very moist chest sounds. Bouts of heavy coughing were productive of a very little tenacious sputum and caused a severe stridor and indrawing of the suprasternal notch. Temperature rose to 103° F. (39.4° C.), pulse 122, and respirations 35.

Treatment consisted of steam tent, postural drainage, and systemic penicillin, with careful observation. Under this regime her breathing became less laboured and the cough more productive. The temperature began to subside on the second day and the stridor had settled by the fourth day. She has made an uneventful recovery, and subsequent examination of the larynx has revealed no abnormality.

Case 3

A girl aged 6 years was admitted with a history of flame burns which occurred during an attack of epilepsy six weeks previously. Her general condition was reasonably good.

Grafting operations were carried out on the sixth and twentieth days after admission. Anaesthesia for these was induced and maintained with nitrous oxide and oxygen and trichlorethylene, and rubber endotracheal tubes were introduced without any difficulty. Six hours after the second operation some stridor was noted, and thought to be due to oedema of the larynx. The usual routine of steam tent and penicillin treatment was adopted, but the stridor showed no signs of subsiding. Twelve hours later she developed an acute respiratory obstruction with deep cyanosis, and an emergency tracheotomy had to be performed with toilet of the air passages by suction catheter. Very moist sounds, especially at both bases, were heard in the chest, and bronchopneumonia was diagnosed.

Twenty-four hours after tracheotomy the tube slipped out of the trachea and into the tissues of the neck, giving rise to surgical emphysema and a left pneumothorax. The tube was reintroduced and the chest aspirated by underwater suction.

Her general condition remained poor for some days, but a final recovery was made. Subsequent chest *x*-ray films showed a resolving pneumothorax and patchy areas of lung collapse.

Case 4

A child aged 4 years was admitted two years after a flame-burn accident for correction of scar contractures and grafting of the defects. Operation was carried out under nitrous oxide and oxygen and ether anaesthesia, and a rubber endotracheal tube was introduced without any difficulty. Operation was uneventful.

Twenty-four hours later she was very chesty and had some stridor and pyrexia. Treatment with steam tent and systemic penicillin was carried out. For a time she seemed to settle down on this regime, though there were occasional bouts of distress with expectoration of a thick mucous material. On the fourth day, however, she developed severe respiratory embarrassment with deep cyanosis and coma. An emergency tracheotomy was then performed, followed by the usual routine of careful aspiration and the maintenance of a clear airway. A pyrexia of 100 to 101° F. (37.8 to 38.3° C.) subsided in a few days and her general condition was very much better. The tracheotomy tube was removed five days later.

Discussion

Four cases have been described of an acute post-operative condition of the air passages of such severity as to cause a respiratory obstruction, and it is the purpose of this discussion to consider certain factors which may have given rise to this grave disaster.

All four patients were female children undergoing grafting operations as the result of burns, and all were carried out under endotracheal anaesthesia. No difficulty was experienced in the intubation of any of these cases, and this was carried out by a different specialist anaesthetist in each instance, in two different hospitals, and the operations performed by three different surgeons. Flexometallic tubes were used in Cases 1 and 2 and rubber tubes in Cases 3 and 4.

Grafting operations in children may require many changes in position for the removal of dressings, cleansing, grafting, and redressing. During these procedures the head may undergo many alterations in position in relation to the body, and this may cause the endotracheal tube to rub and produce friction on the lining walls of the airway. When intubation is used in children great care should be taken to avoid this form of trauma.

Cinchocaine ("nupercaine") ointment 10% was used as a lubricant for the tube in all cases. Systemic intoxication due to cinchocaine is well known, but adverse local effects have not been reported to our knowledge.

A search through the literature has revealed very little on the subject of acute post-operative airway obstructions of this nature. Gittins (1942) included allergy and trauma as aetiological factors in acute non-specific laryngeal obstruction, and yet we cannot find reports of this following the use of the large variety of endotracheal tubes and their various lubricants. Emery (1952) suggests that abacterial agents, by interfering with the growth of bacteria, may upset the liquefaction of sputum and thus give rise to a thick tenacious glue-like material which cannot easily be expectorated, and which is found obstructing the already narrowed airway. It is evident that the post-anaesthetic condition we have observed is, in fact, a form of laryngo-tracheo-bronchitis (Briggs and Heseltine, 1952) which has followed the irritation of endotracheal anaesthesia, and the use of antibiotics may well have aggravated the course of the lesion. It is also suggested that pre-operative atropine may be a factor in the production of thick viscid mucus.

Treatment is a very controversial question, and requires clear thinking in this alarming emergency. In a mild case such as Case 3, steam tent, postural drainage, and penicillin may be sufficient to allow the condition to subside, but careful observation must be kept for worsening of symptoms. If the airway becomes so obstructed by narrowing and tenacious secretions that there is indrawing of the suprasternal notch, cyanosis, or acute restlessness, then there is no doubt that other means of relief must be resorted to. Reintubation and tracheo-bronchial suction may be a life-saving measure, and if easily performed will allow an immediate tracheotomy to be carried out as a set procedure. Continued intubation is entirely illogical in that the added trauma must further offend the already inflamed airway and may produce chronic arytenoid oedema with subglottic swelling and ulceration. Early low tracheotomy with careful and frequent suction toilet of the air passages is the treatment of choice. "We always preach early tracheotomy, but practically always do it late; dangerously late" (Chevalier Jackson, 1921a, 1921b).

Careful aftercare is as important as the tracheotomy in maintaining a clear airway, and this must be the whole-time job of a nurse who is trained in performing suction toilet and in care of the tube.

Summary

Acute laryngeal obstruction occurring as a post-operative condition is described in four cases. Its aetiology and treatment are discussed. It is considered that, though there may be no difficulty on intubation, the trauma of an endotracheal tube is an aetiological factor and that cinchocaine used as a lubricant may be contributory. In the treatment of a severe case tracheotomy is preferred to reintubation.

We acknowledge with thanks the co-operation and helpful criticisms of Mr. Emlyn Lewis, consultant plastic surgeon to the Welsh Regional Hospital Board, and Mr. A. H. R. Champion and Mr. A. McDowell, consultant plastic surgeons to the Manchester Regional Hospital Board, under whose care these patients were admitted.

[We wish to mention that since this paper was written Dr. J. R. Rook has published an article in which three similar cases are cited (*Lancet*, 1953, **1**, 1214).]

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INDIFFERENCE TO PAIN IN LOW-GRADE MENTAL DEFECTIVES

BY

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In the normal course of acute conditions, whether surgical or medical, the symptom of pain is an important factor in diagnosis. In mental defectives, however, this important symptom does not always present. Seven cases are listed below, all occurring in one unit over a period of six months.

Case Reports

Case 1.—A male mental defective (imbecile grade), aged 14, confined to bed, had a series of severe epileptic fits. On recovery he was somewhat confused and irritable. Next day the irritability persisted and he showed some resistance to being moved about at meal-times. Temperatures, pulse, and respirations remained normal. On examination he showed some resentment on movement of the lower limbs, particularly the left, and unnatural mobility was present at the left hip. He could sit up, however, and turn himself in bed. On being referred for *x*-ray examination a fracture of the neck of the left femur was found.

Case 2.—A male mental defective of low feeble-minded grade, aged 42, suddenly collapsed. He was pale, the skin cold and clammy, the pulse rapid and weak, and the respiratory movements were curtailed. Marked upper abdominal rigidity, but little complaint of pain except on deep palpation. A perforated duodenal ulcer was suspected, and he was admitted to hospital, where a large duodenal diverticulum with ulceration at its base was found.

Case 3.—A male mongol of imbecile grade, aged 24, had an attack of what appeared to be catarrhal jaundice. Recovery initially was uneventful, but his condition rapidly deteriorated with gross liver enlargement and lower abdominal rigidity. Temperature, pulse, and respirations were normal. He continued to eat normally and did not complain of pain. His condition rapidly became worse in spite of continued apparent "well-being," and he was admitted to hospital, where he died two days later. Post-mortem examination revealed a tuberculous enteritis.

Case 4.—A female mental defective of idiot grade, aged 12, suddenly vomited clear fluid for no apparent reason, and a short time afterwards passed approximately 1½ pints (1,750 ml.) of dark-red offensive-smelling partially clotted blood per rectum. There was marked abdominal rigidity, and she was deeply shocked but maintained a completely detached and uninterested view of her condition, no mention being made of pain, and no signs of pain were noted. She was admitted to hospital, where a diagnosis of Meckel's diverticulum was made.

Case 5.—A male mentally defective macrocephalic, aged 14 (imbecile grade), fell during a grand mal attack and received a severe lacerated wound of the forehead. He showed no evidence of pain, and the wound was cleansed and sutured without administration of an anaesthetic. His attitude throughout the procedure was one of detached annoyance.

Case 6.—A male mental defective of imbecile grade (congenital word deafness), aged 14, suddenly developed a gross swelling of the left testicle. This swelling attained a size of approximately 3 by 2 in. (7.5 by 5 cm.) but did not appear to inconvenience him in any way. It was decided to admit him to hospital, where a biopsy could be carried out to determine the cause of the swelling. A torsion of the left testicle was found.

Case 7.—A female mental defective of imbecile grade, aged 40, was noticed to have a severe herpes zoster affecting the left fifth and sixth thoracic dermatomes. There was no complaint of discomfort, far less of pain. On the condition clearing she presented no symptoms of post-herpetic pain.

Discussion

These seven cases all show absence of pain where pain would normally be expected. Even allowing for individual variation to painful stimuli it is difficult to understand the absence of pain in these cases.

The only similar examples of indifference to pain as exemplified in this series occur in the condition known as congenital universal indifference to pain or asymbolia for pain. This rare condition is generally diagnosed in childhood, when a child is noticed to have a stoical indifference to episodes causing bodily injury. Several cases have been noted during the past few years, and so far no anatomical basis has been found to explain the condition. There appear to be no post-mortem reports in the literature on the examination of brain tissue from any cases. The outstanding feature in this condition is that the patient can name correctly any painful stimulus applied, but at the same time shows no obvious sign of pain and makes no effort to withdraw from the stimulus. It will be seen that in this condition there is no analgesia or thermanaesthesia. So far there are no reports of mental deficiency associated with this condition.

It will be appreciated that the interpretation of painful stimuli presents a major neurological problem. In this series the problem lies in fixing the level at which the normal reaction to a painful stimulus takes place.

A lesion producing indifference to pain probably appears to interrupt the frontothalamic projection fibres.

It has already been determined that lesions involving the thalamus may affect the sensations of pain and sensibility. The thalamic syndrome of Dejerine and Roussy is produced, being characterized by spontaneous pain and hyperreaction to disagreeable stimuli such as heat and cold.

If the lesion occurs in the associated cortical or subcortical areas the opposite side of the body is then affected. Position sense is lost and two-point discrimination becomes

faulty—astereognosis. Tactile discrimination and weight sense are lost. Crude sense of pain touch and thermal sensitivity are retained, but the degree of recognition may become inconstant. This is the condition of cortical anaesthesia. In discussing lesions affecting the frontothalamic projection fibres the thalamus itself must be considered.

The thalamic nuclei may be divided into three main groups: the cortical relay nuclei, association nuclei, and nuclei with subcortical connexions. None of these nuclei receive ascending fibres. It seems that the area under discussion involves either the association nuclei (dorsomedial, lateral, and pulvinar) or their associated connecting fibres. These nuclei are connected to the following cortical areas: dorsomedial, areas 9, 10, and 12 (Brodman); lateral, areas 5 and 7; pulvinar, areas 18 and 22.

In the modern technique of frontal leucotomy of the partial combined intervention type (leuctopectomy) the object of the operation is the severance of three main groups of fibres passing from the frontal cortex to the thalamus. These groups are: (1) from cortical areas 9, 10, and 45 (Brodman); (2) from cortical areas 11, 12, 13; (3) from cortical areas 24 and 32.

A recent application of leucotomy has been the relief of intractable pain, generally in terminal neoplastic conditions where normal drugs have become useless and the object of operation is to make the closing stages of life pain-free for the unfortunate patient.

Such an operation does not sever any known pain pathways, but the end-result is that the division of the frontothalamic projection fibres completely alters the patient's reaction to pain. It now appears quite certain that the sensation of pain is in no way altered or abolished, but that the patient ceases to worry about the pain and thus relief is obtained.

It will now be seen that this state closely resembles that found in congenital universal indifference to pain.

It therefore appears that the frontothalamic projection fibres involved in the interpretation of pain and the imposition of pain on consciousness derive from cortical areas 9, 10, and 12, and pass into the dorsomedial nucleus of the thalamus. It can be presumed from anatomical and embryological evidence that connexions exist between the thalami and that integration of interpretation from left and right cortical areas will occur.

In low-grade mental defectives the psychological, intellectual, and personality states in many cases can be compared to the changes found after leucotomy in mental patients. This may point to defective development either in frontal cortical areas or in the fronto-thalamic projection fibres. If this is the case, this hypothesis gives an explanation for the indifference to pain found in low-grade mental defectives accompanying acute surgical and medical conditions.

Summary

Seven cases of surgical and medical conditions occurring in low-grade mentally defective patients are reported. In the normal patient these conditions are associated with pain of severe degree. In these mentally defective patients there was a marked indifference to pain, although some discomfort was felt in a few cases.

An explanation has been advanced for this indifference to pain on the theory of frontothalamic projection fibres associated with cortical areas 9, 10, and 12 being defectively developed or in defective development of these cortical areas themselves.

A comparison has been drawn between the condition of congenital universal indifference to pain and the cases in the above series.

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INTRAVENOUS ERGOMETRINE AND THE UNDIAGNOSED SECOND TWIN

BY

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Our purpose in writing this paper is to draw attention to a complication associated with the use of intravenous ergometrine in the control of the third stage of labour. During the past two years, on four occasions in the Princess Mary Maternity Hospital, an undiagnosed second twin has been discovered after the administration of intravenous ergometrine; three of the cases occurred within the space of a fortnight, and this brought the problem to our notice.

Case Reports

Case 1.—The patient, a gravida-3 aged 39, was admitted to hospital as an emergency case of ante-partum haemorrhage four weeks before term. Three hours after admission she delivered spontaneously a live male child weighing 4 lb. 10½ oz. (2.1 kg.). Intravenous ergometrine, 0.5 mg., was given with the birth of the anterior shoulder, but as soon as the child was born it was realized that a twin pregnancy was present. The second twin was presenting as a vertex, and within a few minutes a female child weighing 3 lb. 15½ oz. (1.8 kg.) was delivered spontaneously. The placenta was expressed quite easily after the delivery of the second baby. The twins were in good condition at birth and made satisfactory progress.

Case 2.—The patient, a gravida-2 aged 24, was booked for hospital delivery, and was admitted in premature labour at 30 weeks. The uterus was noted to be slightly larger than for the gestation period, but a twin pregnancy was not suspected. Twenty-five minutes after admission an outlet forceps delivery was performed under local analgesia; the baby, a male, weighed 3 lb. 6 oz. (1.5 kg.). Intravenous ergometrine, 0.5 mg., was given with the delivery of the anterior shoulder. A twin pregnancy was diagnosed as soon as this child had been delivered. A vaginal examination showed the presentation to be a footling, and the membranes were ruptured by the operator. Strong uterine contractions began at once, but no progress was made, and after an interval of 8 to 10 minutes a general anaesthetic was started. Vaginal examination revealed a constriction ring in the lower part of the uterus. The anaesthesia was deepened, and with some difficulty a breech extraction was carried out. The child, a male, weighed 3 lb. 10 oz. (1.6 kg.) and was limp and blue at birth; respirations were never satisfactorily established, and the infant died at 55 minutes. A post-mortem examination was not obtained, but the cause of death was presumed to be anoxia and possibly traumatic cerebral damage. The first twin made satisfactory progress.

Case 3.—This patient, a gravida-3 aged 25, was booked for delivery in hospital and was admitted in labour two weeks before term. After a labour lasting three hours she delivered spontaneously a male child weighing 6 lb. 14 oz. (3.1 kg.). Ergometrine, 0.5 mg. was given intravenously with the delivery of the anterior shoulder, but only with the delivery of this child was a twin pregnancy diagnosed. Vaginal examination showed that the second twin was

presenting by the breech. The membranes were not ruptured on this occasion, and the operator, with his hand, kept the presenting part high in the pelvis until a general anaesthetic had been administered. The membranes were then ruptured and a breech extraction was easily performed 25 minutes after the delivery of the first child. The second twin, a male, weighed 6 lb. 2 oz. (2.8 kg.). The placenta had to be removed manually. Both babies made satisfactory progress.

Case 4.—The patient, a gravida-4 aged 36, was admitted to hospital as an emergency case four weeks before term. After a labour lasting two and a half hours a male child weighing 3 lb. 7 oz. (1.56 kg.) was born. Intravenous ergometrine, 0.5 mg., was given with the birth of the anterior shoulder; a twin pregnancy was diagnosed as soon as this child had been delivered. Vaginal examination showed the second twin to be presenting as a vertex, and the operator kept the presenting part high in the pelvis whilst a general anaesthetic was administered. The membranes were then ruptured and a male child weighing 3 lb. 12 oz. (1.7 kg.) was delivered by forceps; the placenta was expressed quite easily. The first child made satisfactory progress, but the second suffered from repeated cyanotic attacks for several days; the appearance of the second twin strongly suggested mongolism, but this diagnosis has yet to be established.

Discussion

There is convincing evidence that intravenous ergometrine, provided it is given with the crowning of the foetal head or birth of the anterior shoulder, will reduce the risk of post-partum haemorrhage and shorten the duration of the third stage of labour (Martin and Dumoulin, 1953). Certain drawbacks to its use have been noted. Grimes *et al.* (1948) and Priver *et al.* (1949) have reported side-effects such as nausea, headaches, and vomiting, while Martin and Dumoulin noted a significant increase in the incidence of manual removal of the placenta. For the past two years, in our hospital, intravenous ergometrine has been used widely but not routinely in the control of the third stage of labour. During this time there have been 74 cases of twin pregnancy, and nine of these have been undiagnosed. Four out of the nine patients were given intravenous ergometrine as the first baby was being delivered, and details of these cases have been given. One of the eight babies born to these women died, and, although we cannot be sure, we suspect that the death was at least in part caused by the strong uterine contractions which followed the administration of ergometrine; this drug is known to cause tonic contraction of the uterus and is therefore liable to interfere with placental circulation and so lead to foetal anoxia. As a result of the difficulty experienced in the delivery of the second twin in Case 2, we made a point, in the later cases, of not rupturing the second sac of membranes until we were in a position to carry out immediate delivery of the second twin. By conserving the sac of membranes there is less likelihood of the uterus contracting firmly down on the second twin.

So far we have been fortunate in that none of the undiagnosed second twins has been lying transversely. Were this to happen, then the operator might well be faced with a difficult intrauterine manipulation where the uterus had contracted down firmly on the foetus. There might then be a risk to mother as well as to child.

A number of authors have now reported the use of intravenous ergometrine in large series of cases, but, so far as we are aware, no one has acknowledged the complication to which we draw attention in this paper. In our experience the hazard is a real one and must be taken into account when an assessment is made of the advantages and disadvantages of the use of intravenous ergometrine in the control of the third stage of labour.

Summary

Attention is drawn to the complication of the undiagnosed second twin when intravenous ergometrine has been given in the control of the third stage of labour. This complication occurred four times in two years at the Princess Mary Maternity Hospital, and one baby died. Details of the four cases are given.

It is suggested that when this complication occurs every effort should be made to avoid rupture of the second sac of membranes until the patient is under an anaesthetic and immediate delivery of the second twin can be undertaken. With an intact sac of membranes there is less likelihood of the uterus contracting down on the second twin and interfering with placental circulation.

We are indebted to Professor Harvey Evers for permission to publish details of cases which were under his care.

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RENAL CLEARANCE OF CREATININE AND UREA IN THE WEST AFRICAN

BY

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We have previously reported from this laboratory the low levels of plasma urea (Phillips and Kenney, 1952) and the low output of urea following the ingestion of 30 g. of this substance (Kenney, 1953) encountered in the West African subject. The clearance data reported in this paper were obtained in order to provide a further standard of comparison with the European subject. Precise investigation of the renal partial functions, glomerular filtration rate, and the rate of renal plasma flow (Kenney, 1954) had demonstrated the identity of these values in the African and European subjects.

Methods

Ten African subjects were used. All were familiar with the procedure of venepuncture and were trained to empty their bladders completely and spontaneously at frequent fixed intervals. The subjects were typical members of the local labour force, in regular employment and enjoying a good standard of nutrition by African reckoning—that is, a diet containing about 70 g. of protein a day, about one-third of which was meat.

The subjects reported to the laboratory at 8 a.m., after their normal morning meal, and rested in bed for a period of two hours. During this time their water intake was adjusted so as to provide a low urine flow of less than 1 ml. a minute at the start of the experimental period. At the end of this time the bladder was emptied and urine collection started. Urine samples were obtained every 15 minutes for a period of 90 minutes. During this time two or three blood samples were taken by venepuncture with the minimum of stasis. The blood was stored in a heparinized vessel and the plasma separated off by centrifugation for subsequent analysis. During the period of urine collection water was given by mouth in volumes sufficient to raise the urine flow from its original low level to about 5 to 6 ml. a minute. In this way a series of urine samples were obtained over the wide range of urine flows.

Urine and plasma samples were analysed for creatinine and urea by the following methods.

Urea.—The method of Karr (1924) was applied to both urine and tungstate filtrates of plasma in appropriate dilution. The final colorimetric estimation was carried out in a Coleman junior spectrophotometer set at a wavelength of 5,000 Å.

Creatinine.—Diluted urine samples and tungstate filtrates of plasma were treated by an alkaline picrate method (W. S. S. Ladell, 1951, personal communication), the final estimation being carried out in the Coleman junior spectrophotometer set at a wavelength of 5,200 Å.

Results

From the values for plasma concentration, urine concentration, and urine flow were calculated the clearance values for the two substances by the usual formula. The results obtained are set out in the Table, together with the mean values and the standard deviations of the observations. The table also records the mean values obtained on a group of European subjects examined under the same conditions. The values for urea clearance have been divided into two groups—those obtained at urine flows less than 2 ml. a minute and those obtained at higher rates of flow. In both cases the true clearance value is recorded; the empirical standardization of the values obtained at low flows has not been employed.

Urea and Creatinine Clearance Values

Subject	Creatinine Clearance ml./min.	Urea Plasma Concentration mg./100 ml.	Urea Clearance ml./min. flows >2 ml./min	Urea Clearance ml./min. flows <2 ml./min.	Urea Clearance/ Creatinine Clearance
Os ..	121	15·0	—	52	0·43
Wm ..	117	13·5	44	43	0·37
Sa ..	141	12·7	36	50	0·31
Jo ..	145	10·6	36	—	0·25
Go ..	85	10·2	42	37	0·41
Pa ..	168	10·7	36	21	0·15
Ma ..	102	11·9	35	46	0·43
Ge ..	129	16·7	34	31	0·22
La ..	141	18·8	80	54	0·44
An ..	120	19·6	63	46	0·44
Mean ..	127	13·9	45	42	0·345
s.d. ..	23	3·4	16	11	
European values: Mean	122	26·7	70	54	0·48
s.d. ..	12	4·7	8	9	

Discussion

The value obtained for the creatinine clearance is in very good agreement with the values commonly observed in the European subject. It appears that creatinine is as adequate a method of determining the rate of glomerular filtration rate as is the more popular inulin or mannitol clearance, and if this be accepted the glomerular filtration rate in these subjects agrees well with the "world average" for this function quoted by Smith (1951). The creatinine clearance was completely unaffected by the rate of urine flow.

It will be observed that the values of urea clearance are nearly identical whether observed at high or low rates of urine flow. The African subject, therefore, fails to show the "augmentation" phenomenon which is characteristic of urea excretion in the European subject (this is supported by the values recorded in the table).

The absolute values of the urea clearance are low, being only about two-thirds of the normal standard. The average ratio of urea clearance to glomerular filtration rate at random urine flows in 37 normal subjects observed by Raaschou (1948) was 0.65 (range 0.458–0.776). Shannon and Smith (1935) obtained a value of 0.64 (range 0.59–0.67), and Blegen, Haugen, and Aas (1949) reported a mean value of 0.59. The ratio observed in this laboratory for the European subject lies at the lower extreme of the range reported by the Danish workers. This may, however, merely be a reflection of a preponderance of low rates of urine flow in the present European data. In the African subject, even at high rates of urine flow, the clearance value is less than that observed at flows below the augmentation limit in the European subject.

It is well known that the level of dietary protein affects the rate of urea elimination, and for this reason the comparison of African with European data may not be valid. The European subjects investigated had a daily protein intake of about 100 g. (half of which was of animal origin) compared with an intake of 70 g. for the African (about one-third of which was meat). The plasma concentration of urea will, however, be conditioned by the same factor, and, since it is the clearance value which is here being considered, the effect of the lower elimination may be to some extent compensated. Although Jolliffe and Smith (1931) and Shannon, Jolliffe, and Smith (1932) have demonstrated a fall in urea clearance on low-protein diets, this fall has been accompanied by a fall in the filtration rate; in the present series there was no indication of reduced filtration rate.

The possibility that there is a real difference between the mode of urea elimination in the African and the European is the subject for further investigation, with particular reference to the secretory phase of urea elimination which has been demonstrated in the European subject (Barclay, Cooke, and Kenney 1947; Kenney *et al.*, 1950).

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FAT UTILIZATION IN ADULTS ON A DIET OF COWS' MILK

BY

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AND

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Although extensive investigations into the absorption and excretion of fat in infants, both breast-fed and on cows' milk, have been carried out by Holt *et al.* (1919a, 1919b, 1919c), we have found no reference to fat absorption by adults on a milk diet. During the course of another experiment we were required to live on a diet of cows' milk for one month, and below we record our fat absorption and excretion taken over three days of the fourth week.

The fat content of a milk diet is much higher than that of a normal mixed diet. Wollaeger *et al.* (1946) found that on normal mixed diets the amount of fat ingested by adults may be increased to 208 g. a day without gross change in the percentage absorbed, an average of 9% only of the ingested fat being excreted. Annegers *et al.* (1948) studied the effect of varying quantities of fat added to a mixed diet, and found that, within normal limits, neither the quantity nor the type of ingested fat influenced the amount of excreted fat in any individual subject. A normal fat

absorption on a milk diet is therefore to be expected. On the other hand, Holt *et al.* (1919a, 1919b) found that normal infants fed on cows' milk passed more than twice as much fat as infants who were breast-fed, and that the average utilization of dietary fat was 88.6% for cows' milk and 95.8% for breast milk. They also found that the percentage of the total fat excreted as soap was much higher in infants taking cows' milk. We therefore believe that our results are worth recording.

Methods.—The collection of faeces was carried out between carmine markers over a period of three days. The diet consisted of nothing but pasteurized cows' milk, and the intake was kept constant before and during the period of collection of faeces. Five millilitre samples of milk from all bottles drunk were collected, and the fat content of the mixed samples was estimated. The faeces were collected in screw-capped glass jars containing a small amount of formalin, and were dried over a water-bath, ground, and mixed carefully. The estimations of soap, neutral fat, and free fatty acids were carried out in duplicate, using Soxhlet apparatus by the method described by Harrison (1947).

The results are shown in Table I.

TABLE I

	W.H.H.A.	R.H.
Daily milk intake	12 pints	10 pints
Fat content of milk	3·3 g.% (w/v)	3·3 g.% (w/v)
Daily fat intake	225 g.	187·5 g.
Weight of dried faeces (3 days)	147 g.	131 g.
Total fat in dried faeces	28·6%	26·4%
Percentage fat as (1) Soaps	74·5%	72%
(2) Free fatty acids	13·5%	14%
(3) Neutral fat	12%	14%
Total daily weight of excreted fat	14 g.	11·5 g.
Fat intake absorbed	93·8%	93·9%
Total body weight. Gain or loss over one month period on milk in brackets	195 lb. (+5)	155 lb. (nil)
Daily calorie intake approximately	4,450	3,700

Discussion

Although a diet of cows' milk becomes monotonous no difficulty was experienced in continuing it for a period of one month. At times we observed minor degrees of flatulence, but general health was apparently unaffected. One of us, in fact, played competitive tennis throughout the whole period and even travelled to London for the Coronation, having to sit all day in Hyde Park drinking milk. The motions seemed to be increased in bulk, rather constipated, and of uniform consistency and colour (pale) throughout. The calorie intake was obviously adequate, and one of us (W.H.H.A.) gained 5 lb. in weight over a total period of one month on milk.

The most striking feature of the results is that fat utilization is 94% (Table II), a figure well within the usually accepted, roughly defined normal range for adults, in which the amount of fat in the stool should not exceed 10% of the ingested fat. The other feature of interest is the high percentage of the total fat excreted which appears as soap. This bears a close relation to the figures which Holt *et al.* obtained for infants fed on cows' milk. The percentage of total fat in the dried faeces is just above that which is usually regarded as being within normal limits for a mixed diet of average fat content, but below the figure obtained by Wollaeger *et al.* on a mixed diet containing 208 g. of fat.

TABLE II

	Total Fat in Dried Faeces	Percentage as Soap	Percentage as Free Fatty Acid	Percentage as Neutral Fat	Utilization of Fat Intake
W.H.A.A.	28·6%	74·5%	13·5%	12%	94%
R.H.	26·4%	72%	14%	14%	94%
Average for normal breast-fed infants (Holt *et al.*)	34·5%	43·1%	36·7%	20·2%	95·8%
Average for infants fed on cows' milk (Holt *et al.*)	34·1%	60·5%	18·6%	12·1%	88·6%
Average for children on milk with bread and cereal (Holt *et al.*)	30·7%	60·9%	25·1%	14·0%	90·6%
Average for normal adults on a mixed diet containing 208 g. fat (Wollaeger *et al.*)	33·7%	—	—	—	96%

Conclusions

An investigation was made into the fat absorption and excretion in adults on a milk diet.

It was found that adults living on a high fat diet consisting of cows' milk absorb a normal proportion of their fat intake.

As in infants on cows' milk and normal children on a milk diet, a considerable proportion of the excreted fat is in the form of soap.

A milk diet for one month has no adverse influence on health.

The work of one of us (R. H.) was carried out during the tenure of a John Holt Research Fellowship and with the aid of a grant from the Royal Australasian College of Physicians. The milk fat estimations were kindly carried out by Mr. N. Heron, of the City Analyst's Department, Liverpool, and the faecal fat estimations by Mrs. E. Smith, of the Department of Tropical Medicine, Liverpool School of Tropical Medicine.

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Medical Memoranda

Intestinal Polyposis associated with Pigmentation of the Oral Mucosa

This syndrome was described by Peutz (1921) and again by Jeghers (1944), who later collected a further 22 cases from the world's literature. Of the 30 patients so far reported few proved cases have been described in the British Isles.

In view of the apparent rarity of the condition, which may yet prove to be more common than is at present supposed, two further cases are considered worth recording. The first patient, in whom the polyposis is confined to the small intestine, is exceptional in that he has been admitted to hospital on eight occasions with an intussusception and has undergone five operations for this complication. In the second patient the polyposis occurred predominantly in the large intestine, and radical surgery was possible.

CASE 1

A man aged 28 attended in March, 1948, with symptoms of recurrent partial intestinal obstruction. In 1943, when in the Forces, he had been operated on for intussusception. His son, aged 8, has pigmented lips but as yet no symptoms.

He was a dark sallow man with typical pigmentation of the lips and buccal mucosa. Barium enema revealed a chronic ileo-colic intussusception.

At laparotomy on March 15 chronic jejuno-jejunal, ileo-ileal, and ileo-colic intussusceptions were found. All three were reduced. Nine large polyps were present at intervals throughout the small intestine. No resection was carried out. He was subsequently readmitted in six attacks of acute intestinal obstruction.

At laparotomy on May 5 an ileo-colic intussusception was partially reduced. A few inches of ileum and the contained polyp required resection. Pathological examination showed a benign adenomatous polyp.

At laparotomy on May 30, 1949, an ileo-ileal intussusception was reduced; no resection. On April 20, 1950, laparotomy revealed an irreducible ileo-ileal intussusception; 12 in. (30 cm.) of ileum was resected.

In November, 1950, and January and July, 1951, he was admitted with intestinal obstruction and intussusceptions were palpated, but spontaneous reduction occurred shortly after admission. He often suffers from both mild and severe attacks of colic, but so far has required no further admission to hospital.

CASE 2

A boy aged 12 attended in February, 1951, with a rectal polyp. He had had an operation for intussusception in 1939. There was no relevant family history. He was a sallow child with typical pigmentation of the lips and oral mucosa. A polyp was removed from the rectum. Barium enema and sigmoidoscopy revealed no further polyps at that time. A second polyp was removed in July 1951, and in May, 1952, examination revealed a third rectal polyp and mass in the ascending colon.

An exploratory laparotomy on July 9, 1952, revealed a polyp in the jejunum, 12 in. (30 cm.) from the duodenojejunal flexure, a polypoid mass in the caecum, a polyp in the appendix, a polypoid mass in the descending colon, where a chronic intussusception was present, and a polyp in the sigmoid colon; the mucosa of the terminal ileum was nodular, but no true polyps were present. Resection of 6 in. (15 cm.) of upper jejunum and total colectomy, anastomosing the lower ileum to the rectum, were carried out. The pathological report stated "benign adenomatous polyps."

Post-operative progress was complicated in October, 1952, by intestinal obstruction due to adhesions, which were divided. No further polyps have developed in the 4 in. (10 cm.) of rectum remaining.

I wish to thank Mr. Ridley Thomas and Mr. Norman Townsley for permission to publish the histories of these patients, who are under their care, and for their help and advice.

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Intestinal Polyposis associated with Pigmentation and Intussusception in Triplets

Hunter and Wilson (1953) define two types of true adenomatous polyps of the small intestine: (1) those associated with pigmentation of the lips and buccal mucosa and with familial tendencies; and (2) those not associated with pigmentation and no obvious hereditary factor.

In view of the rarity of this condition the following cases of type 1 occurring in triplets are considered worthy of note. All three presented initially with abdominal colic and all showed marked pigmentation of the lips and buccal mucosa, including the gums; all were of sallow complexion and had dark hair.

CASE 1

The patient was first seen on November 17, 1944, when aged 8. For three years, on and off, she had complained of colicky abdominal pain associated with diarrhoea and vomiting. Marked circumoral and buccal pigmentation was noted along with a patchy brown pigmentation of the abdominal wall. A tentative diagnosis of Addison's disease was made, and she was admitted for further investigation. Full blood examination showed only very slight anisocytosis; blood sodium 307 mg. per 100 ml.; and blood potassium 24 mg. per 100 ml. *X*-ray examination showed no suprarenal calcification and the Kepler water test was normal. A diagnosis of mild Addison's disease was made, and she was discharged on January 15, 1945.

She was readmitted on February 10 with symptoms of acute intestinal obstruction. At laparotomy (A. L. L.) 4 feet (122 cm.) of gangrenous ileum was seen and was thought to be due to volvulus. Resection with end-to-end anastomosis was performed. Some calcified tuberculous glands in the mesentery were included in the resection. She was seen again on April 9, complaining of intermittent abdominal pain, but full *x*-ray examination showed no abnormality.

On March 10, 1953, she was readmitted with very severe abdominal pain and symptoms of intestinal obstruction. Examination revealed a large sausage-shaped swelling in the lower and right abdomen. A diagnosis of small-bowel obstruction was made and laparotomy was performed (W. P. C.). An ileo-ileal intussusception extending through the ileo-caecal valve was found. Reduction was impossible, and a right hemicolectomy was performed. A large, simple adenomatous polyp was found to have initiated the intussusception. Convalescence was uneventful, and since discharge she has been seen several times and has remained perfectly well.

CASE 2

This sister was first seen on April 22, 1948, when aged 12, with symptoms of acute small-bowel obstruction. Circumoral and buccal pigmentation was noted. Laparotomy (A. L. L.) revealed an ileo-ileal intussusception 4 in. (10 cm.) in length. This was reduced and an intestinal polyp ¾ in. (1.9 cm.) in diameter was palpated through the bowel wall. The polyp was excised and the bowel sutured transversely. Histological examination showed inflammation of an adenomatous polyp. She was readmitted on May 26, complaining of left lower abdominal pain, but sigmoidoscopy and barium examination revealed no abnormality.

On March 28, 1949, she was again admitted with severe lower left abdominal pain associated with vomiting. At laparotomy a colo-colic intussusception of the sigmoid loop was demonstrated. This was easily reduced, and was found to be initiated by a polyp palpable through the bowel wall. Several other polyps were palpable further up the large bowel as far as the transverse colon. A Paul–Mikulicz resection of the sigmoid colon containing the intussuscepting polyp was performed. The double-barrel colostomy was later successfully closed.

CASE 3

This girl is the only one of the triplets who has not required laparotomy. Nevertheless she was seen on April 9, 1951, aged 15, complaining of colicky abdominal pain. At examination she, too, had marked circumoral and buccal pigmentation. In view of her sisters' history full barium *x*-ray examination and sigmoidoscopy were performed, but no evidence of polyposis could be demonstrated.

COMMENT

The association of circumoral and buccal pigmentation with polyposis of the small intestine and intussusception, though rare, is by now a well-recognized syndrome. The familial tendency of the condition is well demonstrated in these triplets, but no history of similar pigmentation or intussusception could be elicited from the parents or other members of the family.

Hutchinson (1896) first described pigmentation of the lips and buccal cavity in twins, and Parkes Weber (1919) recorded that one had died of intussusception. Jeghers (1944) and Jeghers *et al.* (1949) described the syndrome more fully and recorded 10 further cases. Tanner (1951) added a further case, and Wolff (1952) reviewed the literature and recorded a case of his own. Kaplan and Feuchtwanger (1953) and Kitchin (1953) added three further cases. Hunter and Wilson (1953) recorded yet another case of adenomatous polyp of the small intestine associated with pigmentation and intussusception, and suggested a classification of intestinal polyps. So far as can be ascertained 31 cases have been recorded.

As stated by Hunter and Wilson (1953) the pigmentation occurs early in childhood on the lips and buccal mucosa. It may also occur on the digits, though not in the cases here described. Patchy brown pigmentation was present in the umbilical region of Case 1. Papillomata may occur in the stomach, duodenum, small intestine, or colon, but the small intestine is most frequently involved. In Case 2 both small and large intestines were involved.

There would appear to be no connexion with congenital polyposis coli, as the finding of polyps in the small intestine has never been described in that condition, nor has buccal pigmentation.

Case 3 has, as yet, not required surgical intervention, but the association of marked pigmentation of the lips and mouth with frequent attacks of abdominal colic is strong presumptive evidence of the presence of intestinal polyps.

A diagnosis of intussusception can be made with confidence when there are symptoms of intestinal obstruction and when buccal pigmentation is present.

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A Case of Methyl Chloride Poisoning

Poisoning from methyl chloride is fortunately of rare occurrence despite the fact that, during recent years, there has been a great increase in the use of this substance as a refrigerant. It is, however, extremely dangerous, and, in order that the risks of exposure should be more widely known than they are, the following case is reported.

CASE REPORT

A foreman electrical engineer aged 52 was admitted to Victoria Hospital, Kirkcaldy, on August 7, 1950. The history was that from August 4 he had been engaged in repairing a faulty commercial refrigerator. On the 5th he experienced a feeling of nausea, and in the evening vomited on several occasions. Next day he felt light-headed and dizzy, and his gait was unsteady. He continued at work, however, but on returning home his wife became alarmed at his condition and called in his doctor. His son, who also worked on refrigerator maintenance, recognized the peculiar odour of methyl chloride from his breath.

When he was admitted to hospital his general appearance was that of a drunken man. He was drowsy, his speech was thick and slurred, his gait unsteady, and pulse 100 but regular in time and force. There was slight cyanosis and his blood pressure was 160/104. Mentally he was confused and unable to give a detailed account of himself. Physical examination revealed no abnormality. Laboratory findings: Urine, S.G. 1005; definite acetonuria; no sugar or albumin. Blood: Hb, 88%; plasma protein 7 g.% (albumin 4.20 g., globulin 2.80 g.); blood urea, 50 mg.

Copious dextrose drinks and sodium bicarbonate, 30 gr. (2 g.), were given four-hourly. There was no further vomiting, and his general condition improved greatly during the next two days.

On August 10, however, he became confused and irrational, and the next day he was vividly hallucinated both aurally and visually, and expressed persecutory ideas. He stated that voices were shouting at him from the ceiling and walls, accusing him of being a spy, that microphones were picking up his thoughts and broadcasting them by means of transmitters in the roof. He accused the nurses and doctors of giving him injections in order to control his thoughts and interfere with his genitals. He stated that policemen were staring at him through the windows and discussing how to dispose of him. He was extremely agitated and excited, and adopted a threatening attitude towards the nursing staff and refused to co-operate in his treatment. Arrangements were therefore made for admittance to Stratheden Mental Hospital, Cupar, Fife, and while being transferred by ambulance he made a vicious and unprovoked assault on a male escort. At the time of admission he was so aggressive and truculent that a physical examination was impossible, and, following the administration of 10 ml. of paraldehyde by intramuscular injection, he settled down and slept soundly until the next morning.

On awakening he was quite rational and was able to give a lucid account of himself. Although his memory for the preceding two days was rather hazy he realized he had given much trouble and was most apologetic. His persecutory ideas had now completely gone, and, although he remained hallucinated aurally, he realized that the voices were imaginary. He complained of double vision and admitted having had difficulty in focusing for several days. He stated that while working in the refrigerator he was repairing he realized he was inhaling methyl chloride fumes, but liked the peculiar odour of this substance and therefore did not take the precaution of wearing a mask which was available. The space in which he was working measured approximately 8 by 5 ft. (2.4 by 1.5 metres), had no ventilation, and, so far as he was aware, a high concentration of methyl chloride was present. Physical examination revealed no abnormality and his urinary output was satisfactory. Laboratory investigation showed a marked acetonuria but no albumin or sugar; Hb, 85%; red cells, 4,250,000; white cells, 14,000, with a normal differential count. His previous treatment was continued and progress thereafter was uninterrupted. He was discharged from hospital on August 24.

DISCUSSION

Methyl chloride (CH_3Cl) is a colourless gas, but is used as a refrigerant in liquid form. It has a weak but not unpleasant odour, is only faintly irritant, and does not injure the cornea. It is slightly narcotic, but the general toxic action is severe. There are, however, delayed toxic effects which may occur after apparent recovery. Absorption is rapid, but elimination is slow, and it is considered that concentrations of 100 parts per 1,000,000 are extremely dangerous (Jacobs, 1949). Most cases of poisoning due to this substance have occurred in America, where, in all, 50 cases have been reported. Roth described 10 cases in Switzerland in 1923, and Schwarz recorded 9 cases in Germany in 1926. In Britain seven cases have been reported (Lehmann and Flury, 1943).

The toxic symptoms of methyl chloride are dizziness, restlessness, drunkenness, apathy, anorexia, nausea, vomiting, diplopia, tremors, unsteady gait, psychic disturbances, and convulsions. Delayed symptoms and even death can occur two to three weeks after apparent recovery. It is also stated that death can occur without previous symptoms of poisoning. The delayed toxic action is most likely due to a breakdown product of the methyl chloride molecule in the form of phosgene, formaldehyde, or formic acid.

The post-mortem findings which have been reported include cerebral oedema and minute haemorrhages in the brain, lungs, liver, kidneys, and heart. Degenerative changes are often found in the liver and kidneys (McNally, 1937).

I wish to acknowledge my indebtedness to Dr. William Boyd, late physician superintendent, for his help and advice in the preparation of this paper, and to Dr. J. Buchanan, consultant physician, East Fife, and Dr. Alice Swanston, Department of Public Health, Edinburgh University, for their valuable assistance.

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Reviews

A GUIDE TO THE LANGUAGE OF MEDICINE

Medical Terms: Their Origin and Construction. By Ffrangcon Roberts, M.A., M.D., F.F.R. (Pp. 88+viii. 6s.) London: William Heinemann Medical Books Ltd. 1954.

The English-speaking student of medicine is peculiarly fortunate—though he does not know it—in that the vocabulary of his studies is in a language quite foreign to him. How much easier is his task than that of the ancient student or of one who speaks certain modern tongues, who has to treat his own language quite artificially in order to make it yield the special terms of the art that he is learning. The words that such a student must use have often two meanings, a colloquial and a technical—a most confusing and sometimes dangerous situation. How much better a term, for example, is Greek *Oxygen* than German *Sauerstoff*. The modern English-speaking student learns many new words, but they are words which, for him, are from the first recognized as symbols for things or ideas that are also new to him. Thus the words themselves provide a *memoria technica* which may clarify his thoughts and obviate confusion. Greek and Latin, as educational media, may well be dying, but that is no reason for abandoning Greek and Latin as a source of scientific and medical terms. As media for technical communication in this sense, Greek and Latin, far from being dead, are very fully alive. To abandon the ancient medium would increase, not diminish, both the student's difficulties and the practitioner's clarity of vision. In the reviewer's opinion it is the duty of teachers of medicine to insist on this simple truth at the very beginning of a medical course.

There is rightly much fear of overloading the medical curriculum, but a single evening spent in the careful study of Dr. Ffrangcon Roberts's admirable pamphlet would prevent endless misunderstandings and perhaps months of misapplied work. Dr. Roberts has succeeded in lightening the curriculum, and therefore in lengthening our days, in a very simple and very interesting way. He deserves and will, I hope, receive the thanks of all teachers for this service. The sooner this booklet is in the hands of every student of medicine the better for all concerned. I know of no way in which a practitioner or student can better invest six shillings. For my own part, this booklet will have a permanent place on my writing-table.

CHARLES SINGER.

CLINICAL CYTOLOGY

Klinische Zytologie: Grundriss der Allgemeinen Zytologie und der Zytodiagnostik. By H. J. Streicher and St. Sandkühler. (Pp. 196; 58 illustrations. M. 49.80.) Stuttgart: Georg Thieme. 1953.

More than 20 years have passed since Dudgeon and his coworkers published the first of several papers on the use of the cytological method in the diagnosis of tumours and in the systematic examination of sputa for malignant cells. Exfoliative cytology was subsequently employed by Papanicolaou and his colleagues in the U.S.A. in the examination of the vaginal smear, and has since been adopted for the diagnosis of malignancy in other pathological fluids such as urine, prostatic secretion, and pleural effusions. In the United States the cytological diagnosis of cancer is almost universally regarded as reliable and scientific. British pathologists, however, remain unconvinced and are for the most part unwilling to submit this technique to a fair and rigorous trial. The appearance of this volume is most opportune, for it has the unusual advantage in books on this subject of treating the subject in a commendably broad and comprehensive manner. Two valuable chapters, devoted to general cytology, contain detailed descriptions of the morphological appearances of normal cells and of the many alterations of structure which accompany general pathological processes, including the various types and grades of neoplasia. The remainder of the volume is on cytodiagnosis, organ cytology, and the cytology of pathological fluids and secretions. Fluids and secretions are discussed rather summarily, and this section might be easily and profitably expanded. The informative descriptions of the cells are based on their staining reactions with Pappenheim's panoptic stain, but, in the chapter on gynaecology, on the reactions obtained with Papanicolaou's stain. The illustrations, especially the coloured ones, are good; it is a pity they are so few. Many different methods of staining and microscopy are given in the appendix, including the use of the phase-contrast plate.

The pathological material most suitable for cytological diagnosis includes specimens of tissues and organs removed at operation, biopsy specimens obtained by puncture, smears made from mucous membranes, and various pathological fluids and secretions. There is no doubt that beautiful preparations can be obtained by the smear technique. The cells are less shrunken and the intimate details of nucleus and cytoplasm are much more clearly shown than in paraffin sections. There would appear to be many excellent opportunities in diagnostic cytology for the useful employment of a wide variety of staining techniques and of histochemical methods. The cytological examination of tissues removed at operation concurrently with that of routine sections might help to elucidate the real nature of certain pathological and neoplastic processes which are at present obscure. To those interested in diagnostic cytology this book should prove a useful guide. It can be thoroughly recommended.

J. BAMFORTH.

CHILD PSYCHOTHERAPY

Child Psychotherapy. By S. R. Slavson. (Pp. 332. 30s. or $4.50.) New York: Columbia University Press. 1952. London: Geoffrey Cumberlege. 1953.

The preface to this book leads us to hope that we shall learn from it something true and perhaps new about the development of the individual in relation to the setting in which he grows and lives. The word ecology has reached child psychiatry. Looked at from this point of view, the book is disappointing, since the case material is kept at child guidance level and there seems to be a lack of touch with the analytical theory of the early emotional development of the individual. This is surprising, for the author is an analyst.

He starts by dividing the experiences of childhood into three stages—nurture, discipline, and education. Nurture occurs in early infancy, the child leading a parasitic life, an extension of intrauterine existence. Discipline describes the gradual limitations that are placed upon this autistic and socially unreasonable behaviour. Discipline in this sense strengthens the ego. Education, the third stage, starts at five or six years and is associated with a definite regimen of acquiring skills, learning facts, and training in social behaviour. This view of education is limited and false and is inimical to the healthy development of a balanced personality.

The reader soon perceives that the child is going to be studied in terms of environmental provision. This can be fruitful indeed, but the author is not able to carry back the environmental factors to the places where they originally operate in full force—that is to say, to infancy. We see therefore an elaboration of the now familiar theme of the case history with the child disturbed through faulty environment, and psychotherapy being directed towards the provision of corrective environment or the actual treatment of the parents. This is the usual child guidance practice and there is great value in sensitive work along these lines. That the work in Dr. Slavson's clinic is of a sensitive nature is indicated by many details such as his interest in the child's developing view of himself, in his perception that some parents act as the child's ego (as well as superego), and in his description of an only child's need of a supportive ego, another child with whom to make friends in order to gain entrance to a group.

In this sort of book, as usual, one finds that in most of the case histories there has been a fairly abnormal environment.

The reader is left wondering what psychotherapy would be applied should the therapist be faced with the problem of the child of normal parents who was nevertheless finding life difficult. In the end an illustrative case history is given, and an examination of this shows two interesting facts. It would appear that no analysis is done, in the sense of the interpretation of the unconscious, as it becomes ready for interpretation in the transference neurosis samples. On the other hand, toleration and unexpressed understanding enable the child to find therapeutic gain through a regression in the relationship to the therapist, and to make subsequent progress in emotional development on a firmer basis. The value of regression is not, however, specifically pointed out in the discussion.

We find here valuable intuitive clinical work put forward, but without the psychological formulations which give the work a firm basis. Certainly in certain cases it is better to allow a child to regress and to make new progression, rather than to do the alternative of interpreting without understanding the need for regression. On the other hand, it is very important for psychology that the regressive techniques should be developed by those who are able and can show that they are able to do ordinary psycho-analytic work.

D. W. WINNICOTT.

ELECTROCARDIOGRAPHY

Études Électrocardiographiques. By Jean Laham. Tome 1. (Pp. 285. No price given.) Paris: Librairie Maloine. 1954.

In the first volume of this work on electrocardiographic studies the author discusses myocardial infarction, coronary insufficiency, and pericarditis. Unfortunately, as so often with French books, there is no index, so it is difficult to find what one wants. Discussing infarction, the author claims that in 95% of recent cases characteristic cardiograms can be found, and that the size of an infarct as shown by the cardiogram has a bearing on prognosis; such information as this is easy to find. But there are a number of serious disadvantages to this sort of book. Certainly only the most hard-bitten cardiologist will try to read it, for there is not a single illustration, and the effort of mentally visualizing the curves, the technical description of which appears in the text, is by no means small, even to the initiated.

There are many abbreviations, where capitals stand for words—not easy again for the foreigner to translate. The references are profuse; sometimes ten or twelve lines of them, all in small capitals with the dates in brackets; this makes the text almost unreadable. How much better it would be to collect them all in appropriate herds and refer to them in the text by little numbers. The style is intensely tabular, broken up into short didactic paragraphs, numbered and classified into many headings and subheadings. This seems to be the fashion in some of the French medical publications of to-day. Gone is the elegant fluency of the older writers. Tiring to the eye also are the many statistics, whole series of percentages, and so forth, which may or may not mean much. But if any reader can get over all these difficulties he will find here an enormous amount of information, and the book can well be of great use to the cardiologist for reference, to be taken in very small doses. After all this electrocardiography one might easily forget all about the patient.

TERENCE EAST.

OBSTETRIC STATISTICS

Das Geburtshilfliche Gutachten im Vaterschaftsprozess. By Professor Kurt Podleschka. (Pp. 237; 64 illustrations. M. 33.) Stuttgart: Georg Thieme. 1954.

German scientific literature is replete with compendial monographs which, while contributing little or nothing in the way of original thought or research, emerge mainly as extremely well presented reviews of all the available knowledge to date on their particular subject. The present work, the cumbersome title of which may be translated as "obstetrical aids in the assessment of paternity claims," is characteristic of the genus. The author discusses the problem of disputed paternity from a strictly statistical viewpoint, marshalling the relevant facts with enviable precision and efficiency. He thoroughly dissects the vexed questions of time of conception, date of ovulation, duration of pregnancy, and post-maturity, and reduces them to tabular or graphic form, and he leaves the reader with the impression that the determination of these distressing legal claims is merely a matter of turning up and quoting the appropriate authority. The matter is in practice by no means so simple, for natural variation in these factors is so great that the average court will accept a width of application sometimes amounting to discrepancy. The medical witness, however, will find the concentration into one handy volume of all the scientific data concerning a difficult subject of value in replying to precise legal questioning, and the book should be in the possession of those likely to be so involved.

ALBERT DAVIS.

BROADMOOR

Broadmoor: A History of Criminal Lunacy and Its Problems. By Ralph Partridge. (Pp. 278; illustrated. 21s.) London: Chatto and Windus. 1953.

"On May 15, 1800, a man named James Hadfield was arrested after firing a pistol at King George III in the Royal Box at Drury Lane Theatre. The bullet narrowly missed its mark, as the King happened to be bowing his head at the time to the audience." At his trial it was revealed that the prisoner thought he was acting on the direct instructions of God, who had commanded him to save the world by sacrificing his own life. Suicide being too wicked, he hoped to be executed, but his wish to be hanged, drawn, and quartered was not to be gratified. Within a month of his trial the Criminal Lunatics Act of 1800 was passed, under which persons acquitted on grounds of insanity or found insane on arraignment could be ordered to be detained "until His Majesty's Pleasure be known."

So begins Mr. Partridge's fascinating story. After discussions in the first chapters on insanity from the legal and the medical point of view, Chapter III begins the history of Broadmoor from its founding in 1856 down to a full account of its organization at the present day. The history of the institution is to a large extent a history of its successive medical superintendents, with their varying inclinations to liberalism or rigour. At the beginning, as the author remarks, greater reliance was placed on the science of engineering than on the science of medicine; if one could not try to cure the patients, one could try to keep them inside. Nevertheless, escapes were quite frequent in the earlier days, and have continued on rare occasions until now. The commonest means of leaving the hospital—as it became in 1941—had, up to that date, been by transfer to other mental institutions and by death. However, it is noteworthy that about a quarter of the patients admitted either have been discharged recovered or have recovered and been sent back to prison. One must hope that the next 5,000 patients dealt with will show a considerable improvement on these figures.

Some of the improvements made in the organization during the superintendency of Dr. Hopwood, who retired in 1952, are of interest. He succeeded in introducing parole, despite the misgivings not only of authorities but even of his own staff; needless to say, the parole system has amply justified itself. Doors within the hospital also began to be flung open, so that trusted patients could pass freely from one part to another. Social occasions were begun, at which the sexes were allowed to mix: women number about a quarter of the total, which must be a higher figure than in sane prisoners. Other amenities have been added, bowling greens, away matches for the cricket team, and the famous dramatic society of patients, "The Broadhumorists." It was owing to Hopwood that Broadmoor came to be recognized as a mental hospital, that turnkeys passed away and even attendants became nurses, that patients wear sports coats and flannel trousers and clean-shaven faces. The era of wise humanitarianism had done its best.

ELIOT SLATER.

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HORMONE TREATMENT OF BREAST CANCER

In 1829 Astley Cooper[1] suggested that a functional relationship existed between the ovary and the mammary gland. It was soon recognized that this relationship might be of major importance in the genesis of breast cancer, but it was not until 1896 that oophorectomy was first advocated and performed by Beatson[2] as a means of treating this disease. The operation fell into disuse partly because complete regression of tumour growth was rarely obtained.

Much of our present-day knowledge of breast cancer is based on animal experiments. The carcinogenic potency of the ovaries was first demonstrated in mice by Loeb[3] and his co-workers in 1919, who found that removal of both ovaries from young mice of various strains with a high susceptibility to cancer considerably reduced, though it did not entirely prevent, the incidence of mammary cancer. Then Murray[4] in 1928 found that mammary cancer could be produced in castrated male mice of a highly susceptible strain by grafting into them the ovaries of their sister litter mates. But it was not until Lacassagne[5] announced in 1932 the results of his classic experiment that the relationship between the ovarian factor and breast cancer became firmly established. By repeated administration of oestrogen Lacassagne was able to induce mammary carcinoma in male mice which normally never develop it. This was a very important discovery, not only because oestrogens proved to be the first substances originating in the body which could cause cancer, but also because oestrogens came to be used in the hormonal treatment of certain types of neoplasia which arise in organs under endocrine control.

The next important advance was made by Murray,[6] who discovered that in certain of their biological activities oestrogens and androgens are antagonistic to each other. He found that when male and female mice of a high cancer strain are joined in parabiosis the female partners, which normally develop mammary carcinoma, failed to do so under these experimental conditions. Since then Lacassagne and others have shown that hormonal antagonism, while preventing spontaneous breast cancer in mice, has considerably less influence on growths which are already established and in which malignancy has appeared.

In the clinical field Loeser[7] was one of the first to use testosterone therapy on advanced breast carcinoma in women. Later Adair and Herrmann[8] reported regression of breast cancer with bone metastases following large doses of testosterone propionate, and Mr. R. W. Raven in an article at page 1124 of this issue of the *Journal* describes several cases of breast cancer with metastases which he treated with methyltestosterone. In two instances the survival periods after treatment was begun were six and seven years. Other clinicians, relying on the depression of pituitary function and hence inhibition of ovarian secretions, have used massive doses of oestrogen for the treatment of breast cancer. Haddow and his co-workers[9] in Britain and Nathanson[10] in the U.S.A. have obtained partial regression of advanced breast carcinoma in women with this form of therapy. More recently Stoll and Ellis[11] have published interesting clinical data on the treatment by oestrogens of pulmonary metastases from breast cancer. In the treated group 31% of cases survived over 12 months, as compared with 7.5% in the untreated group. In the treated group 26% showed regression of pulmonary lesions, whereas in the untreated group there was no regression at all.

Since the time of Beatson many workers have reintroduced bilateral ovariectomy for the treatment of mammary cancer, while others have preferred irradiation with *x* rays as a substitute for ovariectomy. The reports of both these forms of treatment are in many instances conflicting. A notable case is now reported by Mr. Raven in which ovariectomy was performed on a woman with breast carcinoma accompanied by cervical and axillary lymph node metastases. The operation was done five and a half years ago, and the patient to-day shows no clinical evidence of cancer and leads a normal life.

Recent work in endocrinology has demonstrated conclusively that the ovaries are largely but not entirely responsible for the induction of breast cancer because of their share in the production of oestrogen. But it must be remembered that under certain conditions the ovaries are capable of secreting andro-

[1] *Illustration of the Diseases of the Breast*, Chapter IX. London: 1829.
[2] *Lancet*, 1896, **2**, 104.
[3] *J. med. Res.*, 1919, **40**, 477.
[4] *J. Cancer Res.*, 1928, **12**, 18.
[5] *C.R. Acad. Sci. (Paris)*, 1932, **195**, 630.
[6] *Amer. J. Cancer*, 1937, **30**, 517.
[7] *British Medical Journal*, 1940, **1**, 479.
[8] *Ann. Surg.*, 1946, **123**, 1023.
[9] *British Medical Journal*, 1944, **2**, 393.
[10] "Endocrine Aspects of Human Cancer," in *Recent Progress in Hormone Research*, 1947, **1**, 261.
[11] *British Medical Journal*, 1953, **2**, 796.
[12] Proc. Internat. Congress of Genetics, Bellagio, 1953.
[13] *J. Urol.*, 1952, **68**, 875.
[14] *Ann. Surg.*, 1952, **136**, 595.
[15] *J. Amer. med. Ass.*, 1954, **154**, 234.

gens, the Sertoli cells of the testis secrete oestrogens, and the adrenal cortex elaborates both oestrogens and androgens. It has become clear, for instance, that cancer in the male breast can now be attributed with some confidence to the secretion of oestrogens by the testis. New light has recently been shed on the hormonal genesis of breast cancer in mice by Muhlbock[12] in Amsterdam. He has discovered that frequent implantations of fresh hypophyses induce mammary neoplasia in the absence of both the milk factor and extraneous oestrogen. This finding is important because it suggests that a pituitary gonadotrophin plays a part in the development of this disease.

There are many encouraging examples by which the growth of a neoplasm arising in a gland under endocrine influence can be temporarily held in check over considerable periods by administration of hormones, but reports of complete recovery from the disease are rare. Reactivation of the tumours almost invariably occurs, and it would seem that, in many instances when a hormone imbalance is created after surgical removal of an endocrine gland or by administration of a hormone, a compensatory mechanism develops in which the anterior pituitary gland stimulates other endocrine organs to make up for the deflection caused by a particular form of treatment.

The work of Huggins strongly suggests that this happens. He has frequently observed that breast cancer in either the male or the female at first shows a favourable response to gonadectomy, but that recurrence of the growth occurs later. Working on the assumption that elaboration of steroid hormones from the adrenal cortex was responsible for the renewed growth of these tumours, he obtained a further regression after bilateral adrenalectomy and the administration of cortisone acetate. Thus he contends[13] that breast cancers may be either ovary- or adrenal-dependent. Occasionally in women they are entirely dependent on the ovary for sustained growth, and this probably accounts for the occasional success which follows treatment by ovariectomy alone. As most breast tumours appear to be adrenal-dependent, Ling-Yuan Dao and Huggins[14] recommend ovariectomy to be carried out before adrenalectomy or both operations simultaneously, since they found it impossible to determine by distinctive morphological characters whether a breast cancer will prove to be adrenal-dependent or not. Pearson *et al.*,[15] using calcium excretion as a measure of the growth rate of mammary tumours with bone metastases, prefer to classify mammary cancer in relation to oestrogen rather than with the organs producing it. One type depends on oestrogen for maintenance of growth and the other type does not depend on oestrogen. Patients with non-oestrogen-dependent tumours fail to respond to ovariectomy and probably also are not helped by adrenalectomy. It is claimed that cortisone induces remission in non-oestrogen-dependent mammary cancer, but this work is too recent to allow a forecast yet on whether improvement can be maintained over long periods.

Endocrine therapy is one of the most interesting and promising fields in cancer research, but until more is known of steroid metabolism it will be impossible to improve much on the sort of result which is being obtained at the present time. We do not know why some patients respond favourably, neither do we know why so many growths prove ultimately to be refractory.

MITRAL STENOSIS

The value of mitral valvotomy for the relief of mitral stenosis is now well established, and the operation is being carried out in many centres in this country and abroad with excellent results in the majority of cases. The success of the operation depends to a large extent on the selection of suitable cases, and this has led to intensive study of the clinical, radiological, and haemodynamic changes in mitral stenosis in the hope of increasing the accuracy of diagnosis. For this reason Dr. Paul Wood's paper on mitral stenosis, published in this and last week's issues, is timely, particularly as he shows that, by applying the results of methods of investigation which can be carried out only in special centres, an accurate clinical diagnosis of the nature and effects of the mitral valve lesion can be made. In the patient with pure mitral stenosis, with steadily and often rapidly progressing disability, the clinical picture is clear cut: there is a right ventricular lift on the left of the sternum, the mitral first sound and the opening snap are loud, there is no third heart sound, and the mitral diastolic murmur is long. A major difficulty in the pre-operative study of patients with mitral stenosis has always been the assessment of the degree of mitral incompetence which may be present, since if this is significant the results of surgical treatment are poor. Serious mitral incompetence will be recognized if Dr. Wood's criteria are followed. The small water-hammer pulse, the hyperdynamic left ventricular apical thrust with electrocardiographic evidence of left ventricular

[1] *Amer. Heart J.*, 1951, **41**, 1.
[2] Gorlin, R., and Gorlin, S. G., ibid., 1951 **41**, 30.
[3] *Amer. J. Path.*, 1936, **12**, 573.
[4] Curti, P. C., *et al.*, *Circulation* (*N.Y.*), 1953, **8**, 893.
[5] *J. clin. Invest.*, 1950, **29**, 602.
[6] Araujo, J., and Lukas, D. S., ibid., 1952, **31**, 1082.
[7] Lukas, D. S., and Dotter, C. T., *Amer. J. Med.*, 1952, **12**, 639.
[8] Editorial in *Circulation Res.*, 1953, **1**, 371.
[9] Rodrigo, F. A., *Amer. Heart J.*, 1953, **45**, 1.
[10] Gorlin, R., *et al.*, ibid., 1951, **41**, 834.
[11] Grant, R. T., *Heart*, 1933, **8**, 275.

hypertrophy, the soft mitral first sound followed by a systolic murmur, the presence of a third heart sound and the absence of the opening snap, and the radiological appearances of dense calcification of the mitral valve, are all definite signs of mitral incompetence and therefore indicate that operation should be avoided.

Most investigators agree on the general pattern of the haemodynamic changes in mitral stenosis, although they differ in their interpretation of the significance of these changes. The cardiac output in severe mitral stenosis is low at rest, and on exercise often fails to increase and may sometimes fall, the additional oxygen necessary during muscular activity being obtained by increasing the oxygen extraction from the blood. With slight or moderate valve-narrowing the resting pulmonary capillary pressure is normal or slightly increased, and the pulmonary-artery–pulmonary-capillary pressure gradient is unchanged, so that there is passive pulmonary hypertension. With more severe stenosis, either calculated by the Gorlin formula[1] or estimated at mitral valvotomy, the resting pulmonary capillary pressure is raised to about 30 mm. Hg, this being approximately the same as the plasma osmotic pressure. With this marked narrowing of the mitral valve orifice the pulmonary artery pressure rises sometimes to the level of the systemic pressure, the pulmonary-artery–pulmonary-capillary pressure gradient is greatly increased, and the pulmonary arteriolar resistance, calculated by the Poiseuille equation, is correspondingly raised.[2]

The cause of this increased pulmonary resistance, which raises the pulmonary artery pressure and adds to the work of the right ventricle, is probably active vasoconstriction rather than the structural changes in the vessels described by Parker and Weiss,[3] since there is no correlation between the calculated resistance and the appearance of the pulmonary vessels studied by lung biopsy at operation.[4] Dexter and his colleagues[5] introduced the concept that the raised pulmonary arteriolar resistance protected the pulmonary capillaries against sudden increases in pressure—possibly resulting from sudden changes in cardiac output—which could cause pulmonary oedema. It has also been suggested that the raised resistance is responsible for the low cardiac output, either directly or indirectly by increasing the pressure gradient across the mitral valve.

Dr. Wood attaches particular importance to the pulmonary arteriolar resistance in relation to the production of both symptoms and signs of mitral stenosis and supports Dexter's view that a high resistance protects the patient against pulmonary oedema. Other investigators, however, have questioned the conception of "protective pulmonary hypertension,"[6,7] and the measurement of pulmonary resistance itself has been criticized, either because of the difficulties in making accurately the measurements necessary for its calculation[8] or because of doubt about the validity of the Poiseuille formula in the presence of turbulence at the mitral valves and varying rates of blood flow.[9] The pulmonary capillary pressure often rises on exercise to 50 or 60 mm. Hg, which is well above the plasma osmotic pressure level, and these patients may develop pulmonary oedema. The pulmonary arteriolar resistance, whether initially high or low, is unchanged on exercise despite the increase in pulmonary capillary pressure, and in these circumstances no protection of the pulmonary capillaries has occurred.[6] It seems that only under resting conditions may the high resistance help to maintain the capillary pressure at a safe level, and this protective mechanism may break down under conditions of stress. The effect of tachycardia in raising the pulmonary capillary pressure may well be the cause of pulmonary oedema in some patients. Tachycardia, whatever its cause, shortens the diastolic ventricular filling period, and a raised left auricular pressure is necessary to increase the pressure gradient across the mitral valve and to maintain the cardiac output.[10]

Rheumatism is one of the commonest causes of heart disease in this country, and if Dr. Wood's estimation of the number of cases of mitral stenosis is correct it is clear that a large number of mitral valvotomies will need to be carried out annually. His series is composed largely of more seriously incapacitated patients, and it should not be forgotten that the disease is not necessarily progressive and that only a minority of those with little or no cardiac enlargement ever develop serious symptoms.[11] A healthy myocardium may be able to sustain for long periods the additional work imposed by the mechanical obstruction at the mitral valve. The operative mortality of 6%, and the 10% incidence of embolism at operation, should discourage operation in symptomless patients or in those with only minimal disability.

REMUNERATION OF CONSULTANTS AND HOSPITAL MEDICAL STAFFS

The discussions on remuneration of consultants and hospital medical staff in the Council last week and the Central Consultants and Specialists Committee a fortnight ago unfortunately only serve to deepen the disquiet many feel about the fate of the Consultant Spens Report and—if that is now in jeopardy—of the

General Practitioner Spens Report, two documents accepted by both Government and medical profession six years ago and deciding factors in persuading a reluctant profession to enter the National Health Service. When Mr. Marquand, as Minister of Health, offered general practitioners £2m. in 1951, they rejected it and determined to press their claim in the terms of the G.P. Spens Report. This was the first overt sign of the Government's—and the Ministry of Health's—wish to undermine the basis on which doctors had agreed to work in the N.H.S. This effort failed. In his able exposition last week in Council of the events that have unfolded since the days of the Negotiating Committee Dr. T. Rowland Hill concluded that the recent agreement was on an "immediate, noncommittal *ad hoc* increase," and that there was no finality in it. He went on to say that the implementation of the Consultant Spens recommendations would be vigorously pursued, and supported the amendment to his report that: "The Council of the Association reaffirms its policy to adhere to the basis of remuneration enunciated in the Spens Reports."

The Staff Side of Whitley Committee "B" believes that "Spens remains the yardstick of consultant remuneration," and no one questions the sincerity of this belief. But do the Government and the Ministry of Health hold the same belief, even without the same fervour? There are, unfortunately, strong grounds for doubting this. Dr. Hill, reading from an agreed minute in last week's Council, referred to the importance attached by the Minister to the Spens Report, and urged that this should be fully reported. The Minister's reply to a question put to him by Sir Russell Brain, as minuted, was as follows:

> "The Minister said that the *only point he was now dealing with was the actual level of remuneration. On other matters he agreed fully with the importance attached to the Spens Report,* which must continue to occupy the same place as before in any discussions the Government had with the profession about the consultant and specialist service." (Our italics.)

The Minister of Health is far too experienced a politician to be so naive as this statement makes him out to be. The whole purpose of the Consultant Spens Report was to determine levels of remuneration of consultants and hospital medical staff in a public service. If words mean what they are supposed to mean, the above statement implies explicitly that the Minister no longer attaches much if any importance to levels of remuneration recommended in a report on remuneration. If any doubts remain they are dispelled by the reply, published in this week's *Supplement*, of the Permanent Secretary to the Ministry, Sir John Hawton, to questions put to him by Dr. Angus Macrae, Secretary of the B.M.A. Sir John Hawton states, quite bluntly, that the remuneration of consultants and hospital medical staff is no longer to be determined "by a mere reference back to the contents of Reports which were produced years ago and before there had been any experience of the working of the Service under modern conditions."

The profession is urged to study with the greatest care the words of the Minister and the Ministry's Permanent Secretary, because they were not thrown off carelessly in the heat of a debate, but represent the carefully considered policy of the Government. And if anyone is unaware of their import a careful examination of the recent agreement should show how little regard has been had to the Spens recommendations. We are told that the Management Side—and the Minister—refused to take "betterment" into consideration—one of the twin pillars of the Spens recommendations. When faced with this completely untenable position the Staff Side would have been wise to go back to their constituents for fresh instructions. Having yielded, and in the face of the Minister's and the Ministry's statements referred to, they face their future course with an uncharted map. The actual amount of additional money for consultants and hospital medical staff is in some ways the least significant aspect of the recent agreement between the Staff and Management Sides of Whitley Committee "B": some consultants even hold the view that no claim should have been made. But few can feel happy about the way in which the negotiations have been conducted; secrecy apart, no evidence appears to have been presented on which a proper claim could be pressed. What stands out is that the first time the consultants have sought to have the Spens recommendations implemented—six years after publication of the Report—they have met with a refusal by the Management Side to discuss betterment. In the face of this it is difficult to maintain that "Spens remains the yardstick."

It is possible to interpret the fate of the Consultant Spens Report on the assumption that in relation to the corresponding report on the remuneration of general practitioners it was too generous. This would indeed seem to have been in Sir Russell Brain's mind when he told the Central Consultants and Specialists Committee on April 28 (*Supplement*, May 8) that the new terms for consultants "had restored the balance between the income of the general practitioner and that of the consultant and specialist." And he added: "Moreover, this agreement was not likely

to be thrown over within a short period of years." But if consultants, as has been asserted, intend to press on with their claims, regarding the recent agreement as only interim and noncommittal, this balance will then be upset, and further claims for the general practitioner will presumably be made—a course often described these days as spiral. The danger of all this is that a kind of "pull devil, pull baker" attitude will arise between the two most important sections of the profession. There is more than ever a need for the closest harmony between the two, and for the co-ordination of effort in all aspects of their work. It will be noted that the Council's first amendment to Dr. Hill's report referred to its continued adherence to the Spens Reports—in the plural. The second amendment deplored the secrecy surrounding the recent agreement. Joint consultation on remuneration between consultants and those they represent and general practitioners would seem to be desirable, indeed imperative, if unity of effort and aim is to be maintained in the interests not only of those now working in the N.H.S. but more especially in the interests of future generations. But neither section of the profession should let the guile of the politician wheedle them out of the standard of living promised by the two Reports drawn up on the basis of carefully ascertained statistics by responsible committees presided over by Sir Will Spens.

THE FUTURE OF NEUROLOGY

In an interim report[1] which has just been issued the Committee on Neurology of the Royal College of Physicians advises the avoidance of a rigid plan for training neurologists, but in general suggests that training should consist of two years' experience of general medicine and surgery followed by five years' hospital work in neurology. As in previous reports,[2] the committee is opposed to a neurology diploma. The report states that, unlike other specialties, there has been practically no expansion of the neurological services under the National Health Service, and that in many parts of the country a neurological opinion is still not easily available. Indeed, there are only 50 to 60 practising neurologists in England and Wales, more than two-thirds of whom are in the London and the metropolitan regions. Finally, the committee points out that the prospects are so poor that promising graduates are becoming increasingly reluctant to enter a branch of medicine in which this country is still pre-eminent.

This report betrays an unsatisfactory state of affairs, for neurology should be contributing to the developments in many growing fields of research, such as the study of cerebral vascular disease and neurotropic virus diseases, the rehabilitation of the paralysed, and the relief of pain. Perhaps the failure of neurology to develop with the Health Service is due partly to a certain lack of political sense in the neurological associations, and partly to the fact that the few neurologists in the country are all so busy with purely diagnostic work that there is little time for them to apply their special knowledge to modern therapeutic possibilities. Many of the smaller specialties form what might be called political pressure groups to develop the specialty in all regions, and it is a sad reflection on modern times that neurologists may have to become more politically minded in order to co-ordinate their national effort more closely and to improve their contribution to modern medicine.

British neurologists must always look to the National Hospital, Queen Square, to take the lead in all such matters, and to maintain a close and helpful interest in the work of her disciples in provincial centres.

[1] Interim Report of the Committee on Neurology, 1954, London.
[2] See *British Medical Journal*, 1945, **2**, 292.

PREVENTION OF CARIES

The prevention of dental caries rather than the expensive treatment of already diseased teeth is the theme of a memorandum[1] drawn up by the British Dental Association's Child Dental Health Committee. The committee has wisely refrained from abstruse discussions on the theory of dental caries aetiology and has confined itself to known facts of practical significance. The report makes clear the overwhelming evidence that dental caries is associated with the stagnation of food, particularly refined carbohydrates, around the teeth. An increase in the consumption of this type of food is accompanied by a corresponding increase in the incidence of dental caries, and conversely less of it results in less caries. This is well illustrated by the lower dental caries incidence in those countries where sugar and sweets were rationed during the two world wars. It is not only the total consumption of these refined carbohydrates that is significant but also the spreading of it throughout the day. The studies in dental caries recently carried out in Sweden have shown that the greatest damage to the dental structures results from eating sweets and other snacks between meals, while a similar total quantity of this type of food taken at mealtimes is not so detrimental.

It is difficult, in the absence of national economic crises, to alter a nation's eating habits, but much can be done by public education in these matters. There is no doubt that dental caries can be reduced by limiting the consumption of sticky carbohydrates, particularly between meals. If the general public is made aware of this by the combined efforts of the medical, dental, and nursing professions, it should be possible to convince people, particularly parents, that dental decay is largely under the control of the individual.

The report also considers other methods of reducing the incidence of dental caries. Toothbrushing, to be effective, must be carried out immediately after eating, and the method of brushing must be one that removes food debris not only from the exposed surfaces of the teeth but also from the relatively inaccessible areas. The

[1] *Brit. dent. J.*, 1954, **96**, 199–220.

cursory toothbrushing that most people carry out does little to prevent decay, and it is clearly the responsibility of the dental surgeon and the dental hygienist to instruct the public in the correct technique. The practice of rinsing the mouth with water after eating is beneficial and presents fewer social difficulties than might be expected. Water is usually available at the table, and the operation of rinsing can be carried out unobtrusively and the mouthful subsequently swallowed. Chemical treatment of the teeth as a preventive measure has been tried for many years, with disappointing results. Topical application of silver nitrate has been shown to be ineffective. The application of silver nitrate appears to slow down an established carious process, as the committee states, but this procedure does not eliminate the risk of a cavity providing a shelter in which food debris can accumulate, allowing caries-producing micro-organisms to multiply there undisturbed and in time affect the contiguous surface of the adjacent tooth. Topical applications of sodium fluoride may not be as successful as was originally hoped, but the results of the large-scale investigation of the Fluoride Working Party of the Ministry of Education are expected to indicate the value of this measure. Various toothpastes have been manufactured containing what are alleged to be caries-inhibiting constituents, but the committee regards these with considerable reserve and some, such as pastes containing penicillin, with disfavour. Further research on enzymes may result in the introduction of certain anti-enzyme substances into toothpastes or mouth-washes, with favourable results.

Apart from dietary control, the most hopeful means of preventing caries is the introduction of one part per million of sodium fluoride into the public water supply. This practice, widely adopted in the United States since 1945, has been observed to reduce the caries rate. An investigation on these lines is proposed for Britain. Here as elsewhere people living in districts with a natural fluoride content of this concentration in their water have been found to have better teeth than people living where the water is relatively lacking in fluoride.

The problem of caries control at present centres chiefly on education of the public: education in what to eat and when to eat it, and what to avoid eating; education in oral hygiene, education to prevent mothers (or grandmothers) from ruining babies' teeth by giving them rubber dummies dipped in sugar or honey; and education to accept or even demand public health measures designed to reduce their children's caries susceptibility. Parents should be encouraged to take their children for routine dental examination at an early age. Neglected teeth result in apical sepsis and pain, and the improvement in a child's health after the extraction of infected teeth is notable. Premature loss of the deciduous teeth, however, usually has a deleterious effect on the occlusion of the permanent dentition, and malocclusion in turn leads to an increased susceptibility to dental caries and predisposition to periodontal diseases. The medical and dental professions can help too by co-operating in devising diets to maintain the general health of the child and ensure not only sound, well-developed teeth but also teeth which are not constantly exposed to a harmful oral environment. The report should be read by everybody concerned with the health and well-being of children.

ELECTRONIC TRANSLATION

The enormous speed at which electrons travel—or so it seems to humans more accustomed to the London–Brighton road—has tempted scientists in many branches of learning to think of new ways in which these wave-particles can be pressed into service. We have become familiar now with electronic "brains" performing elaborate calculations which in certain respects are far beyond the capacity of human brains, and with the paradox that the human brains must yet devise every move made by their electronic servants. Composing the instructions to be given to the machine can be an intricate operation, and a new profession of programmers to do this is no doubt growing apace. One of the tasks they may in years to come be setting their machines is to translate a scientific paper from one language into another. The need for some such aid to the understanding of medical literature is evident to all but natural linguists. Abstracts from the world's literature offer some help, and in fact *Abstracts of World Medicine*, published monthly by the B.M.A., covers nearly 2,000 journals in over a dozen languages. But if machines could be programmed to turn out comprehensible translations of papers and books in a matter of minutes, or an hour or so, the reader's problems would seem to be much simplified.

Discussing the still formidable obstacles to the design of such machines, Bar-Hillel,[1] of the Massachusetts Institute of Technology, begins by drawing a distinction between the kind of writing seen in novels and that seen in technical papers. What he calls the correlating of certain words in the source language with certain words or phrases in the target language can be complicated if the words to be translated bear such connotations as they often do in works of fiction. The phrase "Came the dawn," for instance, would be easier for a machine to translate correctly in a meteorological than a melodramatic context. Nor are scientific papers often wholly free from the kind of linguistic puzzle that Bar-Hillel himself would present to an electronic translator in the following words: "One method involves adding an additional piece of mechanical equipment of a somewhat more involved nature. . . ." Idioms and synonyms would tax the resources of the machines, or at least of their designers, and at first likely alternative meanings might have to be incorporated in the translation and all but the correct one struck out by a human editor. Even so, as Bar-Hillel points out, sometimes this functionary, whom he calls the post-editor, would be presented with literal renderings of idiomatic phrases to which no amount of shuffling of the translated words will give meaning—despite, too, the post-editor's own programme: "The post-editor will be warned that any preposition might have to be replaced by almost any other preposition. . . ."

Probably a more important task for the post-editor—and one on which Bar-Hillel touches—is to act as what

[1] *American Scientist*, 1954, **42**, 248.

we might call a pre-editor. That is to say, he would have to prepare the original paper, by eliminating idioms and so on, so as to present the machine with a verbally unambiguous programme. But as any ordinary editor, neither pre- nor post-, knows, to translate into good English a paper written in bad English is apt to be an almost baffling task even when knowledgeable readers are assumed to be the audience. How much more difficult when the translation is for an unsympathetic electrical circuit. Perhaps the need to write clearly for a human rather than an electronic eye is the more pressing at the moment. At any rate, it seems that some years will elapse before an electronic translator gives any reader the sense of wonder that Keats felt on first looking into Chapman's Homer.

A GREAT RUNNER

Last week at Oxford, Mr. R. G. Bannister, a medical student at St. Mary's Hospital, won the plaudits of the world in being the first athlete to run the mile in under four minutes. His actual time was 3 minutes 59.4 seconds. Since it is only twenty-three years since Jules Ladoumegue was the first to beat 4 minutes 10 seconds, it is natural to ask whether there are any fixed limits to athletic performance and physical endurance. History—including the climbing of Everest last year—suggests that there are not. For many years a record may not be broken, and often it is a round figure which provides the sticking point. But surprisingly, when this point is eventually passed, it is passed by a fair margin. The present discussion of a high jump of 7 ft. will quickly turn to talk of 7 ft. 6 in. once the round figure has been beaten. Only four years ago the weight-lifters wondered if a 1,000-lb. total could be reached on the three Olympic lifts. This figure was first exceeded in 1951 by lifts totalling 1,062 lb., and 1,200 lb. is confidently expected soon.

The limits to man's physical performance are imposed by anatomical, physiological, and psychological factors. Many world champions possess certain natural physical advantages, perhaps most noticeably the long limbs and large vital capacities of so many track athletes, and specialized training can improve even natural anatomical advantages. Exercises of endurance induce capillarization of muscle, the number of capillaries being as much as 45% more in trained than in control animals[1]; and the haemoglobin content of the muscles of trained dogs is more than twice that in untrained dogs.[2] It has been said that a gain in endurance may be mainly a problem of improving transport of the blood in the muscles.[3] Certainly training has to be regular, intense, and rational, and Bannister's training fulfilled all these conditions. His medical education and research into the physiology of exercise have doubtless influenced the actual technique of his training, which included special strengthening exercises.

Athletes cannot hope to better the performances of their predecessors if training is hindered by inadequate facilities or failure to incorporate new and more scientific methods, but psychological factors probably provide, in the form of the challenge and inspiration of new records to be broken, the deciding stimulus which urges men on to ever greater physical endeavour. The effect of intense rivalry on the track is shown by the frequency with which athletes achieve in competition results they have never achieved in training. Athletic records, in fact, are advanced not only by improved training and technique but also by the simple will of man.

[1] Petrén, T., Sjöstrand, T., and Sylvén, B., *Arbeitsphysiologie*, 1936, 9, 376.
[2] Whipple, G. H., *Amer. J. Physiol.*, 1926, 76, 693.
[3] Schneider, E. C., and Karpovich, P. V., *Physiology of Muscular Activity*, 1948, Philadelphia.

WOMEN IN MEDICINE

There are now 7,600 women doctors' names on the *Medical Register*, of whom some 6,000 or more are in active work. This is an impressive number and lends force to the fact that women are now established in medicine and are accepted as a matter of course alike by their male colleagues and the public. Medical women, therefore, might well be excused if they assumed that their major professional difficulties had been overcome. A recent P.E.P. publication,[1] however, and the correspondence in *The Times* which followed, has shown that the path of the married woman graduate to-day wishing to follow her vocation can still be far from smooth: and Dr. Annis Gillie, who last week succeeded another popular figure, Dr. Mary Esslemont, as president of the Medical Women's Federation, thought fit in her presidential address to sound a note of special warning to women medical graduates. None would wish or expect women who have chosen to embark on a professional career to exclude all else from their lives, but marriage continues to remove from the ranks of medical women many who have careers of promise before them, and is likely to go on doing so. A lesser but none the less important effect of early marriage is that it reduces the number of women going on to take higher degrees and thence to a specialty. It is possible for a young woman of determination and character to overcome the impediments to her professional career which marriage entails, but she needs considerable devotion to her work if she is to bear with equanimity the burden of a dual responsibility. Nor is she encouraged to do this by the disheartening cost of paying heavily for her substitute in the home and by the effect of taxation upon a combined income. There is no short answer to these and other particular problems of medical women to-day. Dr. Gillie sees them as a challenge which calls for action by women themselves. A position won must be fortified and held. This is true, but the matter is more than a domestic one and will attract the sympathy of all who would wish to see their women colleagues' contribution to the practice of medicine continue undiminished.

The next session of the General Medical Council will open on Tuesday, May 25, at 2 p.m., when the President, Sir David Campbell, will take the chair and deliver an address.

[1] *Graduate Wives. Planning*, No. 361, 1954, London.

CLINICAL PATHOLOGY IN GENERAL PRACTICE

INTERPRETATION OF ELECTROLYTE CHANGES IN THE BLOOD

BY

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The general practitioner does not very often have to ask the laboratory for estimations of electrolytes; the results of such tests do come to him, however, in the letters about patients who have left hospital; and he himself may want to follow the electrolyte changes in some of the more chronic diseases he meets. This article sets out to recall the meaning of some of the chemical data that may be encountered and to indicate when the determinations may be useful. The treatment of acute disturbances of water and electrolyte balance was fully discussed by Dr. D. A. K. Black* in another Refresher Course. Disturbances in calcium and phosphorus metabolism, which are not closely related to water balance, are not discussed here.

The Body Fluids

The constituents of the body, other than those of the bones and fat, are held in solution in water. This water accounts for 50–60% of the weight of a man, depending on how fat he may be. One-third of this water is outside the cells in the tissues and in the blood; this is the extracellular fluid (E.C.F.). The remaining water, two-thirds of the total, is intracellular fluid (I.C.F.). The electrolyte content of the two fluids is quite different. In the extracellular fluid, sodium (Na^+) is the main cation; chloride (Cl^-) and bicarbonate (HCO_3^-) are the main anions. In the intracellular fluid of muscle, which accounts for most of the intracellular fluid, potassium (K^+) and magnesium (Mg^{++}) are the main cations; organic compounds of phosphorus are among the main anions. In both extracellular and intracellular fluid protein also acts as an anion, and this may be more important in the intracellular fluid, which contains the greater amount of protein.

The following principles govern the composition of the body fluids. The number of anions equals the number of cations. The reaction, or *p*H, depends on the concentration of hydrogen ions (H^+), but this concentration is very small compared with the concentrations of the other cations. The total concentrations of ions (cations+anions) largely determines the osmotic pressure of the solution. Changes in the reaction or in the osmotic pressure of the body fluids are usually rapidly compensated; for instance, a loss of base is likely to be accompanied by a loss of acid, and a loss of salt is accompanied by a loss of water.

Only the extracellular fluid can be sampled clinically. This is done when we collect and analyse the plasma or serum of the blood, although these do differ from the extracellular fluid outside the blood vessels in having a higher concentration of protein. Our knowledge of changes in the intracellular fluid is usually only inferred from changes in the serum. The sodium, chloride, bicarbonate, and potassium are the ions commonly measured.

Sampling

Blood is drawn from a vein with a clean, dry, sterile syringe, with a minimum of venous stasis; a wide-bore needle is better than a very fine one. The syringe may be lubricated with liquid paraffin. Instead of a syringe many prefer a needle with a short length of rubber tubing attached to it through which the blood is allowed to flow. The blood is collected into a centrifuge tube or a screw-capped bottle. If the tube or bottle contains an anticoagulant the blood can be centrifuged and the plasma taken off without delay; this may take up less time than waiting for a clot to form and retract so that the serum separates. Oxalate is a convenient and cheap anticoagulant, but potassium and ammonium oxalates interfere with the determination of potassium and urea. Heparin (2 drops of 1:1,000 solution) does not interfere with these determinations, but it is more expensive. Plasma is needed for the determination of bicarbonate and chloride. Ideally it should be separated from blood which has been collected under a thin layer of liquid paraffin; this is to prevent contact with air and loss of CO_2 by diffusion. Plasma can also be used for determining sodium and potassium, but some laboratories prefer serum separated from blood without an anticoagulant. Serum or plasma for the determination of potassium must be separated as soon as possible because potassium leaves the red cells and gives a falsely high reading in the serum. For the same reason there must also be no haemolysis. The following contribute to haemolysis: traces of water, alcohol, or ether; vigorous expulsion of the blood into the tube, especially through a fine needle; excessive shaking and frothing. Haemolysed blood will not do for measuring the potassium or, incidentally, the phosphate.

The Units of Measurement

Concentrations of electrolytes may be expressed in milligrams per 100 ml. or in milli-equivalents per litre. The latter expression is the more natural, for analytical methods depend upon chemical equivalence, but some laboratories calculate their results in milligrams per cent. For example, they give the sodium and the chloride in the plasma as so many milligrams per 100 ml., and the CO_2 as so many volumes or millilitres per 100 ml. But concentrations of sodium and chloride cannot be exactly compared if they are expressed like this, because a milligram of sodium is not chemically equivalent to a millilitre of CO_2 or to a milligram of chloride. If we wish to make a sum of the anions to compare with the cations, we cannot add milligrams of chloride to millilitres of CO_2. Many people now prefer to use units based on chemical equivalents. For example, equivalent weights of sodium, chloride, and hydrogen are 23 g., 35.5 g., and 1 g. These are also the atomic weights, in grammes, of these elements. Each one of these weights is 1 unit, which is defined as the weight which will combine with—or displace—1 g. of hydrogen. In hydrochloric acid, 35.5 g. of Cl is combined with 1 g. of H to produce the equivalent weight of HCl—namely, 36.5 g. Similarly, in sodium chloride (NaCl), 23 g. of Na combines with 35.5 g. of Cl to give the equivalent weight of the salt of 58.5 g. The equivalent weight of a substance dissolved in a litre of water makes a normal solution.

The unit usually employed in clinical work is one-thousandth of an equivalent weight, or a milli-equivalent (cf. milligram, millilitre). A milli-equivalent of any substance is the amount contained in 1 ml. of its normal solution. For *mono*valent elements a milli-equivalent is the atomic weight in milligrams, but the atomic weight of a *di*valent compound makes two equivalents, so that a milli-equivalent of, say, calcium is the atomic weight in

British Medical Journal, 1950, **1**, 893. Ibid., 1951, **2**, 1207.

milligrams divided by 2. In practice, however, only Na, Cl, CO_2, and K are usually measured in milli-equivalents. A milli-equivalent of CO_2 is the molecular weight in milligrams; the volume occupied by this amount under standard conditions of temperature and pressure is 22.4 ml., so divide by 22.4 to convert millilitres of CO_2 to milli-equivalents. The figure for CO_2 in milli-equivalents is also the amount of bicarbonate, HCO_3^-, that it can form. Note that:

$$1\ \text{mEq}\ Na^+ + 1\ \text{mEq}\ Cl^- = 1\ \text{mEq NaCl}$$
$$(23\ \text{mg.}) + (35.5\ \text{mg.}) = (58.5\ \text{mg.})$$

The following Table shows the relation between cations and anions in normal plasma.

Base	mEq/litre	Acid	mEq/litre
Na^+	142	Cl^-	103
K^+	5	HCO_3^-	28
Ca^{++}	5	Protein	16
Mg^{++}	3	Organic acids	5
		HPO_4^{--}	2
		SO_4^{--}	1
Total	155	Total	155

Isotonic saline (0.9%) contains 154 mEq per litre of NaCl. Although it is often called, physiologically, "normal saline," it is one-sixth the strength of a normal solution in chemical terms.

Changes in total base are accompanied by changes in total acid. Any major change in total base can only come from a change in Na^+; and changes in total acid are largely changes in Cl^- and HCO_3^-. The sum of cations and anions can remain equal in spite of rapid changes in either, because there is an unlimited supply of HCO_3^- from the CO_2 of metabolic processes to make up the balance when required, and any excess is promptly excreted by the lungs as CO_2. The amount of the bicarbonate depends simply on the excess of cations over the other, fixed, anions.

Normal values in milligrams and volumes per 100 ml. are shown for convenience:

Sodium	325–350 mg.
Chloride (as NaCl)	560–620 mg.
" (as Cl)	340–370 mg.
CO_2 combining power	55– 75 ml.
Potassium	16– 20 mg.

The following discussion assumes, however, that all values are expressed so that their chemical equivalence is obvious—that is, in milli-equivalents.

Changes in Na^+ and Cl^- and the Accompanying Changes in HCO_3^-

In conjunction with the clinical history, the levels of Na^+ and Cl^- in the blood give information on the body stores of these ions. The changes in HCO_3^- (bicarbonate) which depend on these levels are also discussed here. Changes in acid–base balance are then described, followed by the changes in potassium (K), which is primarily an intracellular cation.

The *serum sodium* concentration can nowadays be estimated quickly and easily if a reliable flame photometer is available. In general, the concentration of sodium in the serum depends on two things at least: the amount of sodium and the amount of water in the extracellular compartment of the body fluids. A gain or loss in the amount of sodium leads at first to a proportionate gain or loss of water, so that a normal concentration of sodium, and hence a normal osmotic pressure, is maintained. It is only with the more severe disturbances that the serum values become abnormal.

Sodium depletion is the commonest electrolyte disturbance. Abnormal losses are usually from the gastro-intestinal tract, by diarrhoea and vomiting, and through the aspiration or the fistulous discharge of intestinal secretions. Abnormal renal losses of sodium occur in rarer conditions like Addison's disease and salt-losing nephritis, in which a low serum sodium is accompanied by the continued loss of sodium in the urine. In addition, low values for the serum sodium are quite often found in patients with oedema or ascites who have taken a diet low in salt for a long time. Mercurial diuretics, often essential to the treatment, are partly responsible for this complication. They act by increasing the renal excretion of sodium and chloride, and if this does not lead to the desired mobilizing of oedema fluid the concentration of sodium in the body falls. The resulting deficit of sodium may, itself, make the patient ill, and if the serum sodium is low the proper treatment is to restore salt in spite of the risk that oedema may then be aggravated. Occasionally low values for the serum sodium concentration are the result not of a fall in the amount of sodium but of an increase in the amount of water in the extracellular compartment of the body fluids. Low values from dilution with water are observed when the osmotic pressure outside the cells is high compared with that within them; this may happen, for instance, with the hyperglycaemia of diabetes.

A high serum sodium nearly always means a lack of water, and the conscious patient will complain of thirst.

Changes in the *plasma chloride* are not always the result of abnormal gains or losses of chloride. Usually they depend on the changes in the sodium stores of the body or on changes in the acid–base balance. The plasma chloride may rise if an excess of chloride is given, as in ammonium chloride acidosis, or if the renal excretion of chloride is impaired. It may fall if chloride is lost by vomiting. In general, however, the chloride ion in the plasma is but a partner to the sodium; and the bicarbonate ion a passive make-weight in the anion column. The sum of the chloride and bicarbonate (in milli-equivalents) is a guide to the level of the sodium, which is normally some 15 mEq more than these two together. Organic acids in the plasma account for part of the difference between the values for Na^+ and $Cl^- + HCO_3^-$. When, for example, in diabetic ketosis the organic acids accumulate in abnormal amounts, the Cl^- and the HCO_3^- fall and the difference between the determined anions and cations is much increased. The mechanism of the acidosis that accompanies these changes is now considered.

Disturbances in Acid–Base Balance

An explanation of the relation between the CO_2 and the *p*H of the plasma necessitates a physiological digression. The reaction of the blood is maintained near a *p*H of 7.4, just on the alkaline side of neutrality. Two types of disturbance may upset it. One is respiratory, the other "metabolic." Both change the plasma CO_2, but for a given change in the *p*H they change the plasma CO_2 in opposite directions. This has sometimes led to confusion, but it is easily explained.

The CO_2 in the plasma is mostly that which is combined by base as bicarbonate. A small amount in solution forms the carbonic acid. The reaction, or *p*H, of the plasma depends on the ratio of the concentration of bicarbonate to carbonic acid:

$$pH = 6.1 + \log \frac{[NaHCO_3]}{[H_2CO_3]}$$

(The square brackets mean "concentration of,"). The bicarbonate is normally 20 times the carbonic acid:

$$pH = 6.1 + \log 20 = 6.1 + 1.3 = 7.4$$

Now it is clear that the *p*H may vary because of a change in $[NaHCO_3]$ or because of a change in $[H_2CO_3]$, but the effects of these changes will be opposite. Moreover, changes in the one can be compensated by changes in the other. The amount of H_2CO_3 in the plasma depends on the rate at which the lungs get rid of the CO_2 which the body produces. The amount of $NaHCO_3$ depends on the amount of sodium ions, Na^+, not combined with other anions and free to bind bicarbonate.

Respiratory Disturbances

These disturbances depend on changes in the elimination of CO_2 from the lungs and hence on the concentration of carbonic acid in the plasma.

Alkalosis.—This results from the washing out of CO_2 from the blood—for example, in hysterical hyperventilation. The denominator of the fraction $\frac{[NaHCO_3]}{[H_2CO_3]}$ is diminished and the *p*H rises. To compensate for this the kidneys excrete sodium as bicarbonate and so restore the *p*H towards normal. The urine is therefore *alkaline*. The total plasma CO_2 is *low*.

Acidosis.—This results from a failure to eliminate CO_2 as may happen in advanced emphysema, in narcotic poisoning, and with laryngeal obstruction. The $[H_2CO_3]$ increases and the *p*H falls. In compensating, the kidneys conserve sodium bicarbonate and the urine is *acid*. The total plasma CO_2 is *high*.

"Metabolic" Disturbances

These disturbances depend on the amount of sodium that is free to combine with bicarbonate in the plasma.

Alkalosis.—This is the result of an increase in $NaHCO_3$. An excessive intake of alkali can produce it, but a more usual cause is the loss of Cl^- from the stomach by prolonged vomiting as in pyloric stenosis. An excessive renal loss of Cl^- may be produced by treatment with mercurial diuretics. The resulting fall in plasma Cl^- frees Na^+ to combine with more CO_2 as bicarbonate. The rise in $NaHCO_3$, leading to a rise in the *p*H of the plasma, depresses the respiratory centre and there is a rise in H_2CO_3—that is, the metabolic alkalosis is so far as possible compensated by a respiratory acidosis. The kidneys excrete bicarbonate, and the urine is *alkaline*, unless there is also a deficit of Na^+ so severe that this compensation cannot take place. The total plasma CO_2 is *high*.

Acidosis.—This is a result of a fall in $NaHCO_3$. This happens when acids stronger than carbonic acid accumulate in the blood and displace HCO_3^- from combination with Na^+. Such acids are produced in diabetic ketosis. When an acidosis is produced therapeutically with NH_4Cl as an adjunct to mercurial therapy, the Cl^- ion accumulates and depresses the level of HCO_3^-. The fall in $[NaHCO_3]$ may also result from the direct loss of it. This is what happens in the acidosis of chronic diarrhoea. But, however caused, a metabolic acidosis is accompanied by an increased elimination of CO_2 from the lungs because a fall in the *p*H of the plasma stimulates the respiratory centre. The resulting fall in $[H_2CO_3]$ in the plasma compensates for the fall in $[NaHCO_3]$. The kidneys conserve base and excrete chloride, and the urine is acid. The total plasma CO_2 is *low*. In "renal acidosis" the kidneys are unable to excrete acid in the normal way and the urine remains alkaline, while acids accumulate in the body and produce an acidosis, with a low plasma CO_2. This is an exception to the rule that with an acidosis the urine is acid and with an alkalosis it is alkaline. In general this rule does enable one correctly to interpret the changes in the plasma CO_2 which are opposite for respiratory and metabolic disturbances.

I may summarize by showing in tabular form the meaning of a rise or a fall in the plasma CO_2.

Plasma CO_2	Reaction of Urine	Abnormality
High	Acid Alkaline	Respiratory acidosis Metabolic alkalosis
Low	Alkaline Acid*	Respiratory alkalosis Metabolic acidosis

* Except in "renal acidosis."

The metabolic disturbances in acid–base balance are more commonly observed than the respiratory; but either type of change compensates the other. For instance, a metabolic acidosis is compensated by over-breathing, which by itself would produce a respiratory alkalosis. The respiratory compensation is an emergency stop-gap: the metabolic disturbance is, in the end, corrected by the renal adjustments, and this requires that the stores and supplies of sodium and water be normal, so that the kidneys may function normally.

Changes in the Serum Potassium

The changes in the composition of the plasma considered up till now have concerned changes in the extracellular compartment of the body fluids. Potassium is the only intracellular ion to be discussed.

It is only in the last six years or so that it has become widely recognized that deficits of potassium at least as large as those of sodium are quite common; they mostly arise, as do the sodium deficits, from gastro-intestinal losses. It is occasionally necessary to follow the level of the serum potassium in renal disease and during treatment with adrenal hormones which produce an increased urinary excretion of potassium. The level of the serum potassium depends on three major factors: (1) the stores of potassium in the body, so that, on the whole, a low serum potassium (less than 3.5 mEq per litre) means that the stores are low; (2) the acid–base balance, for in the presence of an acidosis the serum potassium is often maintained at the normal level in spite of a cellular deficit of the ion; and (3) the function of the kidney; the renal excretion of potassium is not so delicately adjusted to the needs of the body as the excretion of sodium. The excretion may fail in nephritis and in oliguria, although there is an excess of potassium in the body, and the excretion of potassium may persist in the face of a deficit.

The finding of a low level of potassium in the serum means that there is a deficit of the ion, but the extent of the deficit cannot be ascertained, since it falls almost entirely upon the intracellular compartment of the body fluids. Only severe deficits seem to produce any symptoms.

Conclusion

Problems of electrolyte metabolism often obtrude themselves after therapy with artificial fluids, after operations and during acute illnesses. But they may also arise insidiously in more chronic diseases, and, although their recognition may be a signal for the patient to enter hospital, in many instances these disturbances can be prevented from becoming serious by attention to the diet and to the intake of water and of salts. But the diagnosis must precede treatment, and for this some chemical determinations and their proper interpretation may be unavoidable. The subject is a large one and this article has attempted no more than to point the way.

Next article on Clinical Pathology.—"Laboratory Control of Chemotherapy," by Professor Robert Knox.

THE MEDICAL CURRICULUM

REPORT OF THE UNDERGRADUATE EDUCATION COMMITTEE OF THE FIRST COUNCIL OF THE COLLEGE OF GENERAL PRACTITIONERS

> "The hardest conviction to get into the mind of a beginner is that the education upon which he is engaged is not a college course, not a medical course, but a life course, ending only with death, for which the work of a few years under teachers is but a preparation."
>
> WILLIAM OSLER, *The Student Life.*

The medical curriculum was discussed at the First World Conference on Medical Education organized by the World Medical Association in 1953, at which many original views were expressed and new experiments in medical education described.[1] The British Medical Association has devoted considerable attention to this subject[2 3]; and the creation of the College of General Practitioners is in some part due to a revived interest in, and growing dissatisfaction with, the undergraduate and postgraduate training of family doctors.[4] In the

spring of this year, when 15 of the 22 regional faculties of the College in the British Isles had been formed, it was felt that some of these groups of members and associates, through their faculty boards, might usefully survey the medical curriculum in the light of their own professional experience.

Until then many individual opinions had been expressed, but there had been no means of assessing how widely these were held. The object of this survey has been to put forward certain controversial points, and to bring to light opinions about the medical curriculum held by a number of keen general practitioners. It is hoped that the results may stimulate study, both within the College and by the profession as a whole, and that they may contribute something of value to the work of those responsible for the future teaching policy in medical schools.

In the analysis of the replies to a questionary prepared by the Council of the College, and in this report, we have tried to examine the curriculum in the light of modern requirements—the need to turn out newly qualified doctors with a sound basic knowledge and broad understanding not only of more than 20 specialties but also of general practice and family doctoring. Every medical student must have a sufficiently broad general education to look at the world from a humanitarian rather than a materialistic point of view. He must be intellectually humble and resilient enough to be able to alter his ideas, because time inevitably changes old beliefs. He must develop a self-discipline in his way of thinking to protect himself from specious advertisements, from unscientific publications, and journalistic enthusiasm. He must be the severest critic of his own work.

These are the basic attributes needed by all medical graduates in whatever branch of the profession they eventually elect to serve. To develop these qualities *with economy of time and maximum concentration of effort* is, in our view, the purpose of the curriculum. It is no easy target, and to attain it every item in the medical student's training should be scrutinized and ruthlessly discarded if it does not contribute something essential to these ends.

School Education

When young men or women decide that they would like to become doctors, what is the best way in which they should spend their last one or two years at school?

There is a choice between early specialization in scientific subjects—chemistry, physics, botany, zoology—or continuation of a broad general education, including the classical way of thought, until the time of leaving school. This question is at present exercising the university authorities, some of whom already insist that the young student shall have passed the first medical examination before joining them.

In the discussions which have taken place at meetings of some of the regional faculties of the College, or their boards, only a few doctors have favoured early scientific specialization. The great majority preferred the idea of a liberal education for a liberal profession. One faculty quoted Sir Richard Livingstone in his *Education for a World Adrift*[5]: "The knowledge necessary to living must be imparted. People must be taught to use their brains. . . . Knowledge is important, still more so is the power to use it; but most important of all is what a man believes, what he thinks good and bad, whether he has clear values and standards and is prepared to live by them. . . . As Plato said, the noblest of all studies is the study of what man should be and how he should live. . . . If Greek thought and Christianity created the soul of Western civilization . . . then these are the philosophies for which we are looking, and before his education is completed everyone should have an idea of what they are."

A number of general practitioners were in favour of combining evenly, during the last one or two years at school, a general education with an approach to scientific subjects, but without stretching the latter to the full extent of the syllabus for the first medical examination. Many expressed doubts regarding the necessity of taking chemistry, physics, botany, and zoology to the high level now demanded in the first medical examination; and there was an appreciable feeling that the curriculum could well be shortened in these subjects.

Selection of Medical Students

Are we satisfied with the present method of selection of medical students?

Only one faculty thought that selection now was altogether satisfactory. The others felt that there could be improvement in some way. It is remarkable how great a change has occurred since the 1920's, when almost anyone of reasonable intelligence was welcomed in a medical school. At that time an appreciable number of those who started did not finish the course, because they or their teachers decided that medicine was not for them. It was an automatic method of selection and rejection. Nowadays there are many more applicants than vacancies, so that medical schools have had to adopt some form of selection. This early selection is of great importance; but it is not a simple matter, and we are not satisfied that present methods always admit those candidates who will make the best doctors. Academic achievement in scientific subjects, though important, should not be rated too high at this stage; character, home background, heredity, and school record are probably of equal importance in the long run.

Every study group considered that a wise and experienced general practitioner could usefully assist a dean in the selection of students. Whether or not it is essential for him to be still in active practice is debatable, because this helping in the selection of medical students might be a useful role for men or women who have retired, after a sufficiently long time in general practice, provided that they are not too old. In the selection of all our future doctors, about half of whom will become general practitioners, it seems logical that there should be at least one person on the selection board with first-hand knowledge of the life for which so many of these young people are being chosen.

A Balanced Curriculum

(1) Does the Curriculum Give a Satisfactory Basic Education in All Branches of Medicine?

Each doctor looks back on his own training and treats such a question from his own point of view. Some faculties thought that too much time was spent with the specialties, such as advanced surgery. In the old curriculum it was considered necessary for every medical student, whatever his future, to have a detailed knowledge of anatomy and of the surgery for which this prepared him, so that when he left hospital he would be able to undertake operations which nowadays he would never attempt. Surgery then was taught by general surgeons; nowadays few of these exist, and the student in hospital may have to spend long hours watching complicated, highly specialized techniques which he may never need again.

Some felt that too much time also was spent on the differential diagnosis of obscure conditions, and that there was too little teaching of the simpler variations in health and disease. Nearly all believed that at present the basic curriculum did not, in all schools, include a sufficient insight into general practice. This was discussed in detail last year in the report of this committee on "The Teaching of General Practice by General Practitioners."[6] The aim of the general medical curriculum is, surely, to produce broad-minded doctors rather than medical scientists or skilled technicians.

(2) Is There a Case for Shortening the Basic Curriculum by Omitting Detailed Studies of Certain Subjects?

If students are to be taught more about the commoner diseases and are to be given more insight into general practice, the curriculum will need pruning. There is much dead wood, and also many overgrown branches, which can well be lopped off the present curriculum. The introduction of the pre-registration year and the two years of national service have made this pruning all the more essential.

One faculty quoted Lord Horder[7]: "The anatomy, the physiology, the chemistry, and the physics of the preclinical studies of the medical student should be directed towards the actual examination of the patient. I think we took a step backwards when we put the academic anatomist, physiologist, and chemist in charge of preclinical studies. These men staked out large claims in their respective spheres as though medical students were in training for professorships in these subjects rather than being doctors in embryo. This view led me to plead for spending less time over the intimate structure of the organ of Corti and the theories of colour vision, and more time over . . . simple instruments by which the structure and functions of the normal body are studied. . . . I still meet doctors who have never seen the optic disk clearly, nor the vocal cords at all."

(3) Should More Detailed Attention be Given to Certain Branches of Medicine, and to Common Diseases?

Faculties were unanimous in declaring that this was necessary. Provided the rarer diseases are included to some extent, it should be the hall-mark of a good teacher to illustrate sound medical principles on a disease which is common, as often as possible, rather than on something which is obscure. It is not unusual now to find that the commoner conditions are mentioned only by name and that it is the rarity which is presented for demonstration. The dispensary system of teaching general practice, as at Edinburgh, has given the student a good picture of the commoner diseases.

Dermatology, orthopaedics, psychiatry, allergy, rheumatic disorders, and diseases of the ear, nose, and throat are not always taught as fully as their importance in general practice demands. Paediatrics is not so much a specialty as a grouping together of all branches of medicine and surgery in a particular age group. Family doctors treat many children, and there can be no better training for many branches of medicine, and for general practice in particular, than a spell among children. At the opposite end of life there is the study of the effects of stress and of degeneration on the body and mind. Geriatrics is a subject which has been closely observed by generations of general practitioners; but only recently has it begun to receive in medical schools the attention it deserves.

(4) Should More Attention be Given to the Management of the Individual Patient?

In the Nuffield Trust Survey on General Practice, Dr. Stephen Taylor distinguishes the work of the general practitioner by the one main characteristic of *continuity*. No other doctor has a continuing responsibility for his patient from year to year and from illness to illness, from the cradle to the grave. Any young man who is worth his salt will accept this responsibility as soon as he realizes what is required of him; but it is unlikely that he will appreciate this in hospital, because the patients whom he sees there appear to have been cut off from their family doctors, who rarely enter teaching hospitals. Both general practitioners and consultants are equally to blame for this. Doctors who send their patients to hospital with a scrappy note or a visiting-card advertise themselves as travesties of good family doctors, and are directly responsible for giving both students and their teachers a poor opinion of general practice and the men in it. When we, as general practitioners, write about our patients to consultants we should be on our mettle to show them, and any students whom they may be teaching, that we always take a proud interest in our patients both as individuals and as medical problems. It must be remembered that a derogatory remark about general practice would probably not be made if it were undeserved.

On the other hand, consultants might do a great deal more in teaching this continuity of care to their students if they knew a little more about it themselves from personal experience. Admittedly it is difficult to teach this continuing responsibility in hospital; but there are several ways in which it can be done. One is practised by a consultant in a London teaching hospital, who uses the domiciliary visit as a teaching experience: he always takes a student with him, and we believe that attendance at such a consultation between the specialist and the general practitioner at the bedside is one of the most useful practical experiences for the student that can be devised. Another is in the writing of letters: the student will sometimes see those from the general practitioner to the hospital, but he rarely hears the advice which is sent back from the consultant to the family doctor, or realizes that the patient's visit to the hospital is but a brief episode in a much longer story. A third method is attendance at health centres or at a general practice teaching unit attached to the medical school, as at Edinburgh. The fourth is attendance of students on general practitioners themselves.

(5) Can More be Done to Teach Students the Relationship Between Family Doctors and Consultants?

Closely bound up with this problem of continuing responsibility is the student's assessment of the relative roles of family doctor and consultant. His experience in hospital may give him the idea that all medical roads lead to the hospital, and that general practitioners are merely signposts to the proper out-patient department. Until he goes out himself, he knows little of the great mass of good medical work done by family doctors without reference to hospital or specialists at all, and is unaware that both patients and general practitioners regard the specialist as someone who, by virtue of a particular training and knowledge, can help the general practitioner to care for his patient.

All doctors are members of a team, and the student must be taught that, for the patient's benefit, the co-ordination of all the different functions of this team is the responsibility of the family doctor. The student should learn from the very start how this can be done; he should not have to find it out slowly for himself later on, rather to his surprise. Probably the best ways for this co-ordination to be taught are for students to meet general practitioners from time to time throughout their clinical studies, both outside hospitals—by attending domiciliary consultations and by visits to general practices, health centres, or dispensaries—and inside hospitals—by the presence of general practitioners as lecturers, and as spectators or commentators on teaching rounds. This contact of students with general practitioners will be as valuable to those who remain on in hospitals as specialists as it is to those who go out into the world as family doctors.

(6) Can the Student be Taught to Realize Better the Wide Field Covered by General Practice?

Most of the faculties felt that the student, whatever his future is to be, should be taught to recognize how much of medicine lies within the realm of the general practitioner. When he starts in practice he will then be less bewildered at the wide field he has to cover; and consultants, specialists, and students at hospital will be less mystified by the range of work a general practitioner has of necessity to do himself. The student must learn to appreciate clearly the great volume and variety of service that it is desirable for a family doctor to undertake, and what should be referred to a specialist if there is one within reach. To learn all this will help the student also to discover more easily his own aptitudes and limitations, so that he may decide wisely on his future career.

Conclusions

A questionary on the medical curriculum has been discussed by some of the regional faculties and faculty boards of the College. It is hoped that the results will stimulate further study and a continuing review of medical education. In this interim report it is suggested that:

1. The last two years at school should be evenly divided between receiving a broad education and an introduction to the scientific method.
2. The present method of selecting medical students could be improved by co-opting a general practitioner on to each selection board.
3. The medical curriculum requires revision so as to give students a broader introduction to all branches of medicine, including general practice.
4. The present division between preclinical and clinical subjects is too sharp.
5. There is a tendency for too much time to be spent at present on obscure subjects and highly technical procedures, to the exclusion of a study of common disorders.
6. Medical students should be given more insight into medicine as it is practised *outside* hospitals.

G. O. BARBER (Essex),
Chairman of Committee.
G. F. ABERCROMBIE (London),
Chairman of Council.
J. H. HUNT (London),
Honorary Secretary of Council.
J. CAMPBELL YOUNG (Belfast).
W. V. HOWELLS (Glamorganshire).
J. G. OLLERENSHAW (Yorkshire).
RICHARD SCOTT (Edinburgh).

The Undergraduate Education Committee of the First Council of the College of General Practitioners.

April 28, 1954.

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Reports of Societies

CHRONIC PYELONEPHRITIS

On April 27 at the Royal Society of Medicine the Section of Medicine held a discussion on chronic pyelonephritis. The president, Sir HENRY COHEN, was in the chair.

Professor MAX ROSENHEIM said that it was difficult for a clinician to open a discussion on a condition which only a pathologist could clearly define or diagnose. Chronic pyelonephritis was characterized by scarring of the kidneys with corresponding decrease in their size. The changes could be widespread or localized; histologically the scarred areas showed hyaline degeneration of the glomeruli, dilatation of the tubules, and interstitial cellular infiltration. It was now believed that acute pyelonephritis arose as a bloodstream infection; even in the so-called "ascending pyelonephritis" the infection probably often spread to the kidneys through the blood. The invading organisms were most commonly coliform bacilli. Most acute infections could be rapidly cured; in the absence of an underlying abnormality of the renal tract it was doubtful whether a simple urinary infection ever resulted in chronic pyelonephritis. The disease could be unilateral or bilateral; an underlying cause might or might not be obvious. How often chronic pyelonephritis occurred it was difficult to estimate.

Diagnosis was not always easy, but radiological examination sometimes showed kidneys which were either small or unequal in size. It was often difficult to distinguish the contracted kidney of pyelonephritis from congenital renal aplasia. Clinically, chronic pyelonephritis might present as a case of recurrent urinary infection, raised blood pressure, or of insidious renal failure. Although it was possible for urinary infection to persist for many years without leading to chronic pyelonephritis, it was nevertheless important to cure or control any urinary infection as a safeguard.

A Cause of Hypertension

Chronic pyelonephritis, often bilateral, was a not uncommon cause of malignant hypertension. In many cases of hypertension which had been cured by unilateral nephrectomy the underlying lesion was pyelonephritis. Even though the affected kidney might appear to have useful function, its removal could relieve hypertension. It was not understood why some patients with pyelonephritis developed hypertension while others did not. When renal failure was the presenting feature, pyelonephritis was apt to be confused with chronic nephritis. The absence of hypertension was more suggestive of pyelonephritis, as was a difference in the size of the kidneys. Marked variation in the degree of failure from month to month was also characteristic. In the absence of complicating hypertension, renal failure in chronic pyelonephritis was a slow process and often produced bizarre metabolic disturbances such as the renal bony disorders and the syndromes of sodium or potassium depletion. In the diagnosis of pyelonephritis a history of past or recurrent urinary infection, the recognition of recent severe hypertension, and insidious kidney failure were invaluable guides. Urinary examination was often unhelpful, since the urine might be normal or contain merely a trace of albumin. Pyelonephritis was a disease which could only be diagnosed if its presence was constantly suspected.

Dr. S. J. DE NAVASQUEZ discussed the pathological aspects of pyelonephritis. There was full agreement, he said, on the histological appearances. Microscopically there was replacement fibrosis, often in triangular areas with their apices pointing to the renal pelvis. The renal tubules were atrophic and underwent cystic dilatation. There was a chronic inflammatory exudate, but bacteria were seldom demonstrable. The final stage of contracted granular kidneys was merely the end result of a process which had begun as a simple bacterial infection of the kidney.

Pathogenesis of Pyelonephritis

Experimental methods had solved some of the problems of pyelonephritis where simple anatomical studies had failed. When rabbits were given an intravenous injection of staphylococci, many of them developed renal infection: some rabbits survived the initial infection to succumb later to renal failure. The lesions in such animals resembled those in the human disease. Animal experiments had shown that transient renal infections could give rise to scarring and renal failure. Once the kidneys had become scarred there was, however, a great liability to repeated infection because of the slow blood flow through the granulation tissue. Recurrent infections were usually transient and often passed unnoticed. In the pathogenesis of chronic pyelonephritis it seemed likely that the first stage was a haematogenous renal infection producing acute pyelonephritis. As this disease healed, organization and replacement fibrosis led to intrarenal hydronephrosis. The kidneys were then prone to recurrent attacks of infection, and finally a state of chronic pyelonephritis was produced.

A Difficult Diagnosis in Infancy and Childhood

Dr. J. M. STANSFELD discussed some features of pyelonephritis in childhood. The incidence was difficult to assess, but pyelonephritis was about as common as pyogenic meningitis or intussusception, and, if E.N.T. cases were excluded,

accounted for some 14 of every 1,000 children admitted to hospital. The majority of patients were under the age of 1 year, and at this age the sexes were about equally affected, whereas in older children girls suffered from pyelonephritis much more commonly than boys. In infants the disease was often unrecognized by the family doctor or at welfare clinics. Yet early diagnosis was important if smouldering infections were to be avoided.

The disease was usually overlooked because the clinical features were not well known, because physical signs were sparse, and because pyuria was often difficult to demonstrate. Analysis of the clinical symptoms in a series of cases had shown that gastro-intestinal symptoms, such as anorexia, vomiting, failure to thrive, and constipation, predominated. Symptoms referable to the renal tract were not obvious; rigors and convulsions were rare. Ultimately the diagnosis rested on demonstrating pyuria, and this was sometimes difficult because pyuria was intermittent and modest in amount. Many specimens of urine might need to be examined.

One difficulty had been to establish agreement on how many pus cells could be found in a normal urine. This had been overcome by doing accurate cell counts of urine in a haematological counting chamber. Such cubic-millimetre cell counts had been found a great advantage in revealing pyuria which would otherwise have been overlooked. A cell count of more than 50 pus cells per cubic millimetre in boys and more than 500 per cubic millimetre in girls indicated renal tract disease.

Treatment of chronic pyelonephritis in children was never easy and was a long and hazardous affair. The aim was not merely to sterilize the urine but to eradicate infection from the kidney, and chemotherapy had to be given in full dosage and continued for long enough for this to be achieved.

The Discussion

In the discussion which followed Dr. W. W. PAYNE said he thought there were two distinct groups of children with pyelonephritis. In the first group were placed children with recurrent urinary infections who were completely healthy in the intervals. In the second group the children failed to thrive and often had gastro-intestinal symptoms between the attacks of obvious urinary infection. In this group the histology often showed areas of renal dysplasia; the children had probably started life with some abnormality of the kidneys.

Professor W. C. W. NIXON said that obstetricians in the past had failed to treat urinary infection thoroughly enough, but the tendency nowadays was to treat pyelitis of pregnancy more energetically.

Many other members and visitors took part in the discussion, and it was clear that the current problems of pyelonephritis were attracting the attention of not only physicians but surgeons, pathologists, and radiologists as well.

LOCAL MEDICAL SOCIETIES

Manchester Medical Society

The results of a blind trial of oral cortisone in severe chronic asthma was described to the Section of Medicine by Dr. William Brockbank (with Dr. R. S. Savidge) on April 7. Twenty-four patients were included in the trial, ranging in age from 17 to 70. Thirteen received regular maintenance doses of cortisone and 14 an indistinguishable control. Three who were failures on the control were given cortisone. Of the 13 cortisone cases, six improved greatly in their ability to work and play; four more improved, but mostly subjectively; one was not improved and died eight months after cortisone was discontinued; two died while still taking the drug. In the 14 controls there was no improvement in eight patients and one died. Side-effects were few, increasing weight being the most important. The longest remission after withdrawal of the cortisone was 11 weeks. Most cases tended to relapse within a few days. It was concluded that cortisone could not cure asthma, but some cases of long-standing chronic asthma could be effectively controlled by moderate doses of oral cortisone, provided the dosage was maintained. But in some undefined types of asthma cortisone treatment was dangerous to life.

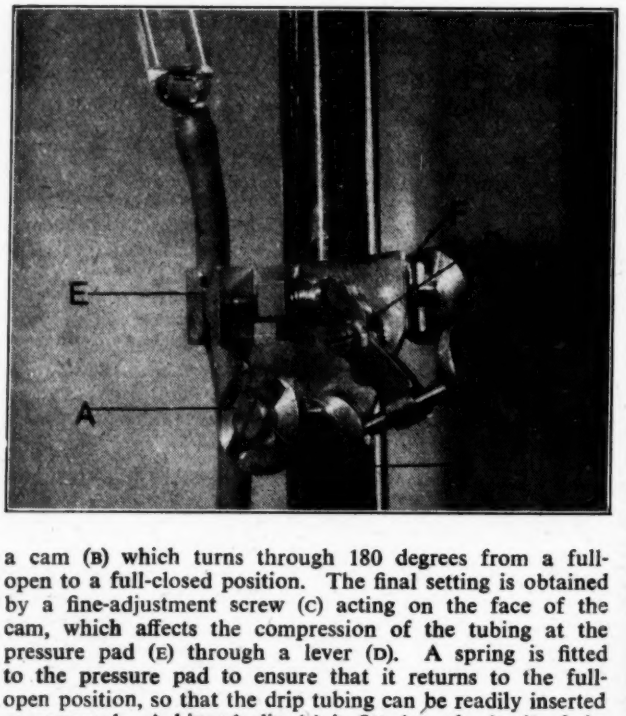
In a recent presidential address to the Section of Pathology, Dr. T. Blench spoke on the Law and Medicine. While the Law sought for certainty, Medicine dealt with clinical probabilities. Yet lawyers chided doctors for differing and also for not being willing to differ. Doctors could be sued as a result of their calling, but actions against counsel were banned by statute. Lawyers loved words and documents; but Medicine did not, in contradistinction to Advocacy, lend itself to verbal analysis and verbal agility.

Preparations and Appliances

AN IMPROVED DRIP CONTROL

Dr. G. HERINGTON, consultant anaesthetist, Wanstead Hospital, writes: The increasing use of succinylcholine chloride and other relaxants and anaesthetic agents by intravenous drip calls for a more accurate method of control than the gate clip provided with the standard giving set. The gate clip has two disadvantages: it requires two hands for manipulation, and it is often difficult to adjust the flow rate exactly to the desired level, particularly when a low rate is required. The former difficulty is overcome by clamping the apparatus direct to the upright of the drip stand, while the greater accuracy is obtained by the use of both coarse and fine adjustment controls.

The apparatus illustrated here was designed and made by Mr. E. L. Powell, of Buckhurst Hill, to fulfil the above requirements. The coarse adjustment (A) is provided by



a cam (B) which turns through 180 degrees from a full-open to a full-closed position. The final setting is obtained by a fine-adjustment screw (C) acting on the face of the cam, which affects the compression of the tubing at the pressure pad (E) through a lever (D). A spring is fitted to the pressure pad to ensure that it returns to the full-open position, so that the drip tubing can be readily inserted or removed. A hinged clip (F) is fitted to the back of the apparatus, so that it can be clamped easily to the upright of the stand.

In practice the cam is put to the full-open position, the tube is inserted, and the cam turned to the approximate position required; an accurate setting can then be made by means of the fine-adjustment screw. If desired, a flow rate of as little as one to five drops a minute can readily be obtained.

Correspondence

Preservation of Blood Samples

SIR,—The preservation of blood samples sent by post to the chemical laboratory presents special difficulties. Frequently haemolysis occurs, and is attributed to bacterial infection despite careful collection of the sample. In samples submitted for estimation of blood sugar, fluoride is often added to prevent glycolysis, and recently formaldehyde was recommended for the preservation of samples submitted for determination of the urea content.[1] It has been brought to our attention that formaldehyde may interfere with the estimation of urea by a urease-Nessler method, and this we have confirmed. However, samples for haemoglobin estimation have been sent as far as from London to Australia without deterioration when streptomycin and glucose were added as preservative, and we have found that streptomycin does not influence the estimation of urea by the Nessler method of King.[2] The streptomycin is dissolved in distilled water and added to the containers, which are then dried in a warm oven, stoppered, and kept until required. We have used a concentration of 1 mg. of streptomycin base to 10 ml. blood. Although this preservative has only been tested for haemoglobin and urea estimation, it seems likely that it has a much wider application. This point is under examination here.—We are, etc.,

Postgraduate Medical School, London, W.12. R. I. S. BAYLISS. I. D. P. WOOTTON.

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Undescended Testicles

SIR,—Since no one will question Mr. Denis Browne's skill as an anatomist, diagnostician, or operator, it is obvious that only with great reluctance can I bring myself to comment upon some of the points he makes in his letter (*Journal*, April 24, p. 987). Indeed, bowing to his great experience, I will not attempt to deal with each and every one of them; but there are some on which I fear I do find myself in disagreement.

Like Mr. Browne, I too find the majority of boys referred to me as "cryptorchid" have testicles which can be made to descend into the scrotum—all the way—and are clearly in need of no treatment. Only their parents need reassuring. But there are others in whom I am quite honestly unable to say whether the apparent non-descent is due to ectopia or to retractability. Perhaps Mr. Browne never encounters this uncertainty. My experience, admittedly much inferior to his, has been that the response to gonadotrophin has proved of value in distinguishing the two types.

In the course of running a fertility clinic, I see, from time to time, infertile men with histories of cryptorchidism. Some of these have had operative treatment close to or after puberty; others may have had spontaneous descent at the time of puberty. Now, while it is possible that congenital testicular deficiency may have coexisted with the cryptorchidism, it is difficult to reject the view that some at least of these men would have been fertile had testicular descent been achieved—by any means—at an earlier age. Perhaps Mr. Browne never has made a mistake—but has *none* of the many boys he has considered could safely be left alone let him down, in that spontaneous descent failed to occur before puberty? And if there have in fact been some such mistakes, are these boys now fertile men? Surely this is the crux of the whole matter: unless infallible predictions can be made, some avoidable infertility will result, which, with all due respect, is not likely to come to the knowledge of Mr. Browne.

I will gladly concede Mr. Browne his little joke on the twenty-minute record for descent after hormone injection. By "there and then" I naturally meant within the period of a course of injections of something like 1,000 I.U. of chorionic gonadotrophin given twice weekly for ten weeks. I have never seen the "serious physical and psychological side effects" mentioned by Professor C. Wells (*Journal*, April 17, p. 932) resulting from such a course of treatment. As for continuing hormone treatment for three or four years, quite obviously no one who has the least idea about the matter would countenance such an absurdity. Rare though worry about non-descent may be, the fact is that some boys and more parents are prone to it. I have, moreover, seen instances where it arose quite early in development. I cannot see why no attempt should be made to deal with it by hormone treatment—if that treatment is likely to succeed.—I am, etc.,

London, N.W.1. G. I. M. SWYER.

Early Recurrent Acute Intussusception in Children

SIR,—In their interesting article, Mr. David A. Macfarlane and Mr. L. P. Thomas (*Journal*, March 6, p. 559) draw attention to the rare complication of early recurrent acute intussusception in children and report four personal cases. Among 26 proved cases of intussusception admitted to a Danish general surgical hospital in the period 1944–53 we have seen two similar cases.

Case 1.—A male child aged 5 months was admitted to Surgical Department A of Frederiksberg Hospital on January 3, 1947, with a seven hours' history of attacks of abdominal colic, and before admission blood-stained stools had been passed. On examination the child was pale and looked ill, but there was no gross dehydration. Between the colicky attacks a sausage-shaped tumour was felt in the left hypochondrium. A barium enema revealed an ileo-caecal intussusception, and reduction beyond the hepatic flexure was accomplished, but, as a complete reduction was not obtained by this method, laparotomy was decided upon. *First operation.* Under general anaesthesia the abdomen was opened through a lower right para-rectus incision. A small amount of serous fluid was encountered, and the intussusception in the ascending colon and caecum was reduced without difficulty. Its apex in the ileum was 3 cm. from the ileo-caecal junction, and here the intestinal wall showed cyanosis and oedema. For the first three days after the operation the post-operative course was uneventful, and stools were passed on the second post-operative day.

On the morning of January 6 attacks of abdominal colic started again, and the patient vomited several times. He became worse, with signs of dehydration, and the abdomen was tympanitic; on auscultation metallic bowel sounds were heard. A straight *x*-ray examination of the abdomen showed a dilated small bowel loop, and a barium enema showed normal filling of the colon, with the barium entering the ileum. Thus no radiological signs of intussusception were found, but signs of obstruction of the lower ileum were present. After the administration of 250 ml. of normal saline his symptoms subsided, and he spent a quiet night. The next morning his condition was again worse, with vomiting and abdominal colic. Laparotomy was decided upon. *Second operation.* Under general anaesthesia the previous wound was reopened, and moderately distended coils of small bowel presented themselves. About 180 cm. from the ileo-caecal valve an ileo-ileal intussusception was found and reduced. The post-operative course was uneventful, and the child was discharged on January 24, 1947.

Case 2.—A female child aged 6 months was admitted to our department on April 13, 1953, with a history of repeated attacks of vomiting and abdominal pain for the past 24 hours. There had been no bowel action since the previous day. On examination the child was seen to be in a good general condition and showed no signs of dehydration. A sausage-shaped tumour was felt in the right hypochondrium. Rectal examination gave no further information. A barium enema showed an ileo-colic intussusception that could not be reduced, and operation was decided upon. *First operation.* Under general anaesthesia the abdomen was opened through a lower right paramedian incision. There was a considerable quantity of clear fluid in the peritoneal cavity, and the ileo-colic intussusception was found with its apex 10 cm. up in the ascending colon. Its reduction was easy, and it had originated as an ileo-ileal intussusception 15 cm. from the ileo-caecal valve. Numerous enlarged mesenteric glands were noted. The post-operative course was uneventful, and the child left hospital on April 22, 1953.

The same evening there was again vomiting, and blood-stained mucus was passed. She was again admitted to our department. A lump was felt above and to the left of the umbilicus, but an hour later it had disappeared. The next morning the lump

was again there, and there were attacks of abdominal colic. *X*-ray examination of the abdomen showed a dilated coil of small bowel, and a barium enema showed normal filling of the colon with no barium entering the ileum. A diagnosis of recurrent small bowel intussusception was made, and laparotomy undertaken. *Second operation.* Under general anaesthesia the abdomen was opened through the previous wound. Distended coils of ileum presented themselves in the wound, and a 20-cm. long ileo-ileal intussusception was found, with collapsed ileum distal to it. The origin of this intussusception was proximal to the previous one, and it was easily reduced. After an uneventful post-operative course the child was discharged on May 5, 1953.

The number of published cases of early recurrent acute intussusception in children given by Macfarlane and Thomas as 81 is thus increased to 83.—I am, etc.,

Copenhagen, F., Denmark ERIK CHRISTENSEN.

Toxaemia of Pregnancy in Identical Twins

SIR,—Identical twin sisters, aged 24 years, have recently been delivered at two different hospitals within six months of each other by caesarean section, the indications being pre-eclamptic toxaemia not responding to treatment. An almost identical sequence of events took place in the twins, and the salient points are presented in table form below.

	Case 1	Case 2
Blood pressure at first visit to antenatal clinic (12 weeks)	154/80	110/60
Blood pressure on admission	170/110	170/110
Maturity on admission	34 weeks	34 weeks
Oedema on admission	Trace	Absent
Proteinuria on admission	"	"
Treatment	Sedation	Sedation
	Caesarean section after 3 days	Caesarean section after 13 days
Liquor drained at A.R.M.	30 oz. (0·8 L.)	30 oz. (0·8 L.)
Blood pressure at operation	152/114	165/110
Birth weight and sex at operation	5 lb. 6 oz. (2·4 kg.) male (live)	5 lb. 14 oz. (2·7 kg.) female (live)

Two sisters of these twins, not themselves twins, are under our care, one having recently had an abortion after several pregnancies without toxaemia, the other having had hyperemesis gravidarum but no toxaemia in her first pregnancy. The mother of the twins has hypertension and last year suffered a cerebral haemorrhage.—I am, etc.,

Greenford, Middlesex. L. A. PIKE.

"Edwardian" Adolescents

SIR,—It is characteristic of many social problems that interest in them is periodic. This is especially true if the problem concerns youth, sex, or crime, and Dr. Margaret Lowenfeld's letter (*Journal*, May 1, p. 1040) touches upon all three. The letter is paralleled by newspaper headlines such as "Girl Attacked by Edwardian Youth Gang." This renewed interest in an old problem has perhaps been precipitated by the recent change from excessively padded, "finger-length," drape suits, startling tie, with thick-soled crepe rubber shoes (called "creepers") to the present Edwardian-like style. Foreign students assure me that an exactly comparable sort of youth exists in many other parts of the world. A book such as F. M. Thrasher's *The Gang* (1927, University of Chicago Press) shows that comparable groups existed in Chicago at least as far back as the 'twenties. As a contribution to a book to be published shortly by Messrs. Butterworth, edited by the late Sir Norwood East, I have outlined the psychology of these youths, who, it would seem, are basically handicapped by strong unadmitted feelings of inferiority. Their exhibitionistic, bombastic, restless ways express their need of reassurrance that they can be masculine, tough, command attention, and that they can exist independently from their mothers. They feel easier when banded together with equally handicapped individuals. Their vast majority is content with parading a well-lit street, meeting in "caffs," fighting rival "mobs," and feeling their way towards more mature behaviour. Their dancing, since Dr. Lowenfeld raises the matter, is of two main sorts; in one the boy progresses monotonously, *back first*—that is, in the girl's position—round and round the floor; the other is the jive in which the boy shuffles *inactively* without moving forward, while the girl performs a highly active series of pirouettes before him.

The family background of these youths commonly shows factors which, acting over the years, have tended to keep the individual in a passive, over-dependent position. Most typical is an imbalance of parental influence; this may mean a possessive mother who holds the family reins and belittles the males of the family, a father who, either because of physical absence or of personal qualities, does not help the boy to cut the apron-strings; the imbalance may be *between* the parents or in the inconsistency of *one* parent. In general the family setting resembles that of homosexuality and the perversions, but differences of degree and perhaps of heredity impel or enable these youths to struggle successfully against that biologically less satisfactory solution to their problem. Seriously antisocial youths, those who actually use their weapons and who assault others, are (in spite of publicity) relatively uncommon. Most of the dangerous types are not of this Edwardian type, but if they do happen to be so then one finds either a coexisting psychiatric condition (perhaps demonstrable by electro-encephalography) or a history of frank hostility from the parents, or domination by a much more pathological companion.

While further investigation into this problem is much needed, I make a plea that these youths should not be regarded as a new phenomenon and that, in this group too, there are more sheep than goats.—I am, etc.,

London, S.E.5. PETER SCOTT.

Adolescence

SIR,—I note that in your leading article (*Journal*, March 27, p. 748) somebody decries the fact that no one has ever investigated the effect of National Service upon the character of the youth of the country. As I am employed in the psychiatric unit in the Royal Air Force, I am most interested in the project. Perhaps the writer of the leading article could advise me how to embark upon such a study. The easiest manner to decide the beneficial or other effect of National Service would be to compare the work record of young men who have done their National Service with those who are not subject to it, and here the first difficulty of lack of suitable controls becomes apparent. I am most interested in the subject and I would be greatly obliged for any advice as to how such an investigation could be undertaken.—I am, etc.,

Halton, Bucks. P. J. O'CONNOR.

Doctors and Technicians

SIR,—Every doctor should read the letters of A. E. Brown and F. Mather (*Journal*, April 24, p. 983), since they give a clear indication of the direction of medicine. These two technicians are emphatic in their demands for recognition. A. E. Brown states: "The days when the medical laboratory technologist [lab. assistant as he was called in my days] was merely an assistant are long gone—except perhaps in certain university laboratories. The work performed by the technologist nowadays is nearly always done without direction, and the subsequent reports are sent out on his responsibility." While F. Mather states that "the interpretation of findings have passed, or are passing, from the domain of the pathologist to that of the technician. It will be found, particularly in the field of blood transfusion serology, that some of the greatest authorities in the country are not medical men but technologists. . . . It would seem, therefore, to be more justifiable to state that in many respects the technologist has, or should have, equal status to the pathologist." I have heard these claims made by doctors who demanded such assistance, and I know that the claims are not without foundation, for men acquire knowledge and skill worthy of recognition only by doing

the jobs. As Ruskin stated: "There is no furniture of a man's mind which he has a right to exalt in, but that he has hewn and fashioned for himself."

Animal technicians, laboratory technologists, radiographers, photographers, chemists, physicists, therapists, midwives, nurses, dietitians, and a score of others, are being trained to do the work which formerly doctors did for themselves, and as these aids are all provided free in the Welfare State, together with abundant elaborate equipment, the doctor is concomitantly losing his ability to do these things, and, more important still, the ability to assess their value or accuracy, and has to trust to the words and works of others who have not had a basic medical training and do not have the personal responsibility to the patient. Such doctors still seek to be judged for recognition on the works of others by demands for greater elaboration, more ostentatious buildings and furniture, expensive spectacular apparatus, abundant white-coated staff and secretaries. How long can they hope to keep their highly paid, jargon supplying, supervisory posts, when they themselves appear to be losing their power of writing even their signature to reports? Even the Welfare State may think it is paying a great deal for the use of a rubber stamp when all these workers demand equal status to the doctor. The discipline of the pre-N.H.S. days, which forced men to do their own jobs, was good for medicine; but when the demands for the total abolition of private practice are acceded to, and the doctors are left at the mercy of administrators and planners, God help the patients, medicine—yes, and the doctors.—I am, etc.,

Birmingham, 15. JAMES F. BRAILSFORD.

Bovine Tuberculosis

SIR,—May we be permitted to reply to the letter of Drs. R. W. Kind and M. C. Brough (*Journal*, April 17, p. 936) on the subject of bovine tuberculosis? Many parents and a number of schools give children unboiled, specially designated "tuberculin-tested (T.T.) milk" believing it is most unlikely to contain tubercle bacilli. We would repeat our previous statement (*Journal*, March 13, p. 646), that it offers the consumer no guarantee, and we submit the time is long overdue for explaining to the public the true facts about T.T. milk. We do not assume, as Drs. Kind and Brough have implied, that all parents could or always should be persuaded to give boiled milk to children. We appreciate some consider it unnecessary, others too much bother, and that many children will not drink it, but these are not valid reasons for withholding the advice generally. Obviously when milk is universally pasteurized a reasonably good safeguard will be provided for all.

We apologize for having inadvertently used the word "accredited" *per se* in our previous letter. The herd to which we referred was attested tuberculin-tested (the highest Ministry grading). All its members were reported non-reactors in July, 1953. One cow developed a sore on the udder in September, 1953, milking continuing for a further fortnight. The beast was slaughtered in October, found to be heavily infected with tuberculosis, and thereafter all milk was pasteurized. A further two months elapsed before the herd was retested, when eight cows, five being young animals, reacted. To date fourteen children have been notified with clinical tuberculosis which we believe has resulted from drinking unboiled milk from this herd. The figure includes one case of intussusception associated with a tuberculous mesenteric adenitis. Most of the children drank the unboiled T.T. milk at home and at school, but two received it only at school, one of these having always had pasteurized milk and the other boiled T.T. milk in the home. Lest it be thought this incident is the unfortunate exception that proves the rule, may we mention that we know of others. Milk which can bring about these results cannot be described as "representing a reasonable universal level of safety."—We are, etc.,

Marlborough. T. R. MAURICE.
Oxford. HUGH ELLIS.

Elderly Psychiatric Patients

SIR,—I feel Dr. F. Houston (*Journal*, May 1, p. 1036) misunderstood my letter (*Journal*, April 10, p. 876). My plea was for the abolition of the term "arteriosclerotic dementia" in favour of "post-apoplectic dementia." The large majority of patients who suffer from strokes were not demented prior to the stroke, or are so after they have recovered from the initial effect. In a small number of cases following a second or third stroke there may be intellectual loss and the patient may more easily be provoked to tears. The intellectual level then remains static unless a further stroke occurs.

All the above have presumably suffered from cerebral arteriosclerosis for a number of years, yet the dementia, if it occurs, is related to the apoplexy and not the arterial lesion. The term arteriosclerotic dementia suggests a progressive intellectual loss, and this gives the wrong impression. I am quite sure that necropsy evidence of cerebral infarction does not correlate with arteriosclerotic dementia, as the large majority of cases are not demented. The discrepancy between clinical and pathological lesions has been noted many times, notably by the careful work of Rothschild.[1 2 3] I feel Dr. Houston should publish fully his knowledge of deaths following modified E.C.T., as this may be a very serious criticism.—I am, etc.,

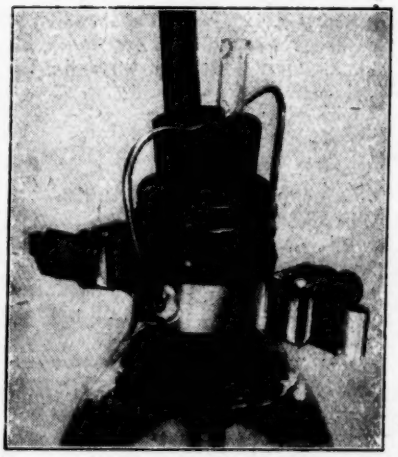
Sheffield. G. I. TEWFIK.

REFERENCES

1 *Dis. nerv. Syst.*, 1947, **8**, 123.
2 *Geriatrics*, 1947, **2**, 155.
3 *Amer. J. Psychiat.*, 1947, **100**, 501.

A Bung-holder

SIR,—A simple device to prevent ejection of the rubber bung of the giving set during a positive-pressure transfusion can quickly be made as follows.



The band of a standard M.R.C. type bottle-holder is bent, as shown in the photograph, to fit closely round the neck of the transfusion bottle. The "wings" thus formed are secured by artery forceps or drip-regulating screw clips. The hanger loop is bent into an "M" shape so as to press firmly upon the bung when the device is in place.

I am indebted to Male Charge-Nurse J. Atkinson, of the Royal Victoria Infirmary, Newcastle-upon-Tyne, for this suggestion.—I am, etc.,

Newcastle-upon-Tyne, 1. J. A. G. HORTON.

Injection into Artery

SIR,—It would seem that the warrant for Dr. O. H. Belam's statement made in court and reported in the *British Medical Journal* of March 27 (p. 766) is in fact that so far he has not had the misfortune to inject thiopentone into an artery.

In the letter published on April 10 (p. 875), in which he attempted to mollify his dogmatism, Dr. Belam appears to be equally dogmatic. What does he mean by "an experienced person"? Would a thousand intravenous injections enable one to claim experience? I had certainly performed several times this number before I had the misfortune to inject thiopentone into an artery. I was well aware of this hazard, and had several times inadvertently punctured an

artery and recognized the fact before I had the misfortune to do so without eliciting the usual signs of this mishap. Almost 2 ml. containing 0.1 g. of thiopentone was injected before pain drew attention to my error. This was followed by blanching and then coldness of the affected limb segment. I shall continue to believe that I exercised "reasonable" skill and care and that intra-arterial injection of thiopentone cannot be entirely avoided.—I am, etc.,

Guernsey. BRIAN WEBBER.

The Winter Vomiting Disease

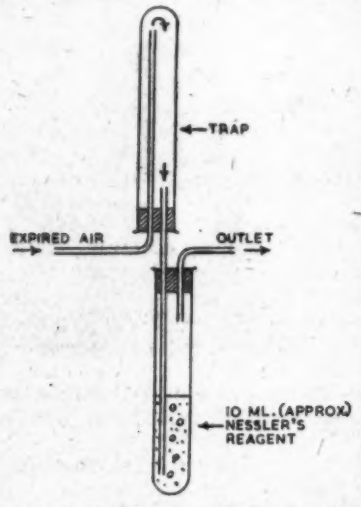
SIR,—Similar outbreaks of the winter vomiting disease occur in Australia and are known by various names in different localities—"gastric 'flu," "three-day sickness" (after the bovine complaint), and so on. Winter vomiting is not a very good name here, as the attacks are often in summer, but goldfish spawn in November here as in England, without reference to the season, so perhaps we could call it "February vomiting" or "after Christmas vomiting." The mention by Dr. J. H. Whittles (*Journal*, February 6, p. 333) of infective hepatitis prompts me to remark that the incubation period of our disease is three days, whereas hepatitis is four to six weeks.—I am, etc.,

Wollongong, N.S.W. M. C. MCKINNON.

Acetone Tests in Diabetic Coma

SIR,—The tests for acetone using 2,4-dinitrophenylhydrazine, described by Drs. Ole Sylvest and René Dybkaer (*Journal*, April 3, p. 816), may be a useful method of detecting acetone in the breath.

In Dr. R. D. Lawrence's clinic we have been using a similar sort of test for some time, in which the patient breathes into Nessler's reagent. If acetone is present a heavy milky white precipitate forms within 20 seconds when there is heavy ketosis, or after 40 to 60 seconds in milder cases. In order to minimize the risk of inhaling this mercury-containing solution, we think it wise to use a simple piece of apparatus made from two boiling tubes in which there is a fluid trap, as shown in the accompanying diagram. The rapidity at which the precipitate forms will of course depend on the volume of air expired, varying with the rate and depth of respiration and the degree of co-operation by the patient. The precipitate is presumably not specific for acetone, being due to a chelation compound with mercury. A high concentration of tobacco smoke also gives a faint white discoloration, but only after several minutes of hard blowing, and alcohol gives a very slight haziness, neither of which are likely to be confusing. With 2,4-dinitrophenylhydrazine a similar cloudiness also forms with tobacco smoke.



We have already carried out both these tests in a few patients, clear positive reactions being obtained in three patients after 35, 70, and 80 seconds with Nessler's reagent, though no visible colour change or crystal formation had occurred after 120, 120, and 300 seconds respectively with 2,4-dinitrophenylhydrazine. For those physicians with a poor sense of smell, tests for acetone in the breath may be of help, but they are far less important than examination of the urine by the old-established methods.—We are, etc.,

K. J. GURLING.
London, S.E.5. H. R. MILLAR.

Food-poisoning Due to Cl. welchii

SIR,—Having been printed in the same issue of the *Journal* as Dr. A. Beck, Dr. A. W. H. Foxell, and Dr. W. C. Turner (March 20, p. 686)—and bearing in mind Professor T. N. A. Jeffcoate's views on public correspondence—I have hesitated to endorse in print the findings of your contributors who reported an outbreak of food-poisoning due to heat-resistant *Cl. welchii*. In the last year I have observed two such outbreaks and intend to publish the reports of these in the *Journal of the Royal Army Medical Corps*. The following data, I think, are consistent with the findings of Drs. Beck, Foxell, and Turner, and I am indebted to the Editor of the *Journal of the Royal Army Medical Corps* for permission to publish them here.

	Day	No. Examined (with Symptoms)	No. Positive for Heat-resistant *Cl. welchii*
Outbreak 1 (men at risk 138; men with symptoms 48; total number of patients examined 30)	2	30	30
	15	20 (repeat)	7
	26	7 „	3
	36	3 „	2
Outbreak 2 (men at risk 300; men with symptoms 25; total number of patients examined 18)	2	2	1
	3	2	2
	4	2	2
	12	12	6

Service conditions facilitate the follow-up of such cases, and, following the second outbreak, investigation of the food-handlers revealed two men who had had no symptoms but who persisted to excrete the organism intermittently for at least four months. One of these men, who was involved in handling meat, appears to have been the source of this outbreak.

The second outbreak was traced as a result of experience gained during the first and consequent reference to the work of Dr. Hobbs *et al.*[1] I am sure that the second outbreak would otherwise have escaped detection, and I agree that a heat-resistant variant of *Cl. welchii* may well be a commonly undetected cause of this type of food-poisoning.—I am, etc.,

Newcastle-upon-Tyne. J. GERALD COLLEE.

REFERENCE

[1] *J. Hyg., Lond.*, 1953, 51, 75.

SIR,—I was interested to read the account of an outbreak of food-poisoning due to *Clostridium welchii* (*Journal*, March 20, p. 686) reported by Drs. A. Beck, A. W. H. Foxell, and W. C. Turner. In one of the schools in the Nashoba Health District, Massachusetts, in May, 1953, we had a similar food-poisoning outbreak with more than 100 children, teachers, and staff upset. In following up the causation it was noted that the only article of diet which was suspect was turkey meat. A specimen of this turkey meat was recovered from the garbage can by the sanitation officer. This was the day after the food had been eaten. This specimen smelt very badly. Cultures of the specimen, however, revealed no staphylococci, no salmonella, but a Gram stain of a direct smear of the meat revealed large Gram-positive rods abundantly throughout the meat. The meat was inoculated into litmus milk in two tubes and a stormy fermentation arose in 24 hours. In thioglycollate broth a cloudy growth with cottony clumps deep in the tube and gas resulted. The organisms also grew on thioglycollate agar, in Brewer plate, with a good growth of white colonies spreading in wet places. A large Gram-positive rod with the morphology of a clostridium was revealed microscopically, but no spores were seen. The biochemical reactions showed acid in lactose, sucrose, dextrose, and maltose. Spores were never seen from the organisms, although the latter were kept in the laboratory for about six weeks on the milk thioglycollate broth and a thioglycollate agar.

The turkeys which were eaten for this school lunch had been brought from a storage freezer in a neighbouring town in the frozen state. However, on the way from the storage refrigerator

unit the carrier truck was allowed to stand out in the open for several hours. The turkeys were then taken to the school and on the following day were prepared for cooking, that is on the afternoon before consumption. During the preparation one of the workers noted that one of the three turkeys had a peculiar red colour—but did not smell bad, nor did she notice any bad smell at all. The turkeys were cooked in the normal manner, and, because they were very hot and it was relatively cool weather, the cook left the turkeys out on the kitchen table at room temperature until the next morning, when the meat was shredded and divided up, a sauce being poured over the shredded meat. No pupil or teacher complained of anything objectionable about the dinner at the time of eating, although practically without exception the children and teachers who partook of the dinner had a sharp turn of diarrhoea, nausea, and general upset within 24 hours, mostly within eight to ten hours of eating the turkey. The normal reports were made to the State Health Department but no conclusions were come to as to the possibility of the toxic properties caused by the clostridium being responsible for the upset. This staff felt, however, that the large anaerobic Gram-positive rod (resembling a clostridium) was in fact responsible for the illness. Later the bacteriologist in the unit, Mrs. Marjorie Dunlap, experimented with turkeys, and she noticed that the turkey meat cooked promptly after *defrosting remained sweet and firm for six days although kept at room temperature*. Organisms from the turkey which had been recovered from the garbage can were inoculated into this meat and they stayed alive at room temperature but did not cause any particular decomposition. But she felt that possibly decomposition would have occurred if moisture had been added. On the other hand, turkey meat allowed to defrost and kept raw for five days at room temperature was found on examination to have Gram-positive rods in the meat taken from the shoulder or from the skin. These organisms were not seen in the abdominal cavity. It was unfortunate that in this outbreak very few stool specimens were obtained and in those no special organisms were found. In conclusion it was felt that (although not proved) turkey meat properly cooked but carelessly handled was in fact responsible for the outbreak.

In this department it is felt that the advice offered by Drs. Beck, Foxell, and Turner regarding the risk involved in preparing meat dishes prepared the day before their consumption is worth noting, and we in Nashoba have advised our own school systems to make certain that food cooked the day before consumption is properly refrigerated before being used. As a result of this outbreak in one of our schools we have prepared a standard school luncheon series of regulations.—I am, etc.,

Ayer, Massachusetts. KENNETH I. E. MACLEOD.

Carcinoma and Neuropathy

SIR,—Within recent years much interest has centred upon the association of neurological disorders (polyneuropathy, cerebeliar degeneration, etc.) with malignant disease, particularly carcinoma of the lung. In this connexion the report by Dr. P. L. de V. Hart (*Journal*, March 13, p. 606) is of considerable interest. It is, however, important to realize that all cases of proximal muscular weakness developing in patients with malignant disease are not due to a neuropathy. Indeed, an association between dermatomyositis or polymyositis and malignant disease has been recognized for some years, and has been discussed recently by Curtis and his associates.[1] In the case descriptions given by Dr. Hart one looks in vain for any absolutely convincing evidence that his patients were suffering from a neuropathy. The clinical picture which he describes is equally compatible with, if not more suggestive of, polymyositis. The pattern of muscular involvement in both cases was typical of this disease; the first patient had a skin rash and in the second the electromyogram showed that some motor units were "broken up as is seen in neurogenic lesions." Disintegration of motor unit potentials occurs to a much greater extent in primary muscle disease than in a neuropathy.

Dr. Hart refers in an addendum to an account by Dr. R. A. Henson[2] of eight cases of proximal motor neuropathy in association with carcinoma of the bronchus. At least one of Dr. Henson's patients was believed to be suffering from polymyositis, and from his descriptions, in the absence of pathological evidence, it is impossible to be sure that this was not true of other cases in his series. The remittent course of several of them makes this a very real possibility. Dr. Henson mentioned that certain of his cases showed fatigability of muscles like that seen in myasthenia gravis, and two showed temporary improvement after prostigmine. In this connexion it is interesting to recall the recent reports of myasthenia in cases of bronchogenic carcinoma.[3 4 5] In one of these reports[3] a battery of diagnostic tests suggested that the patient was suffering from true myasthenia gravis, but in the other two cases the diagnosis was less certain. I have recently observed considerable and sustained improvement in muscular weakness on prostigmine therapy in two cases of polymyositis, though the response was certainly not as good as that seen in true myasthenia gravis.

I make these points in order to stress the fact that many patients with carcinoma who develop proximal muscle wasting and weakness, with involvement of neck and pharyngeal muscles, are suffering from polymyositis and not a neuropathy. The correct diagnosis can generally be made by muscle biopsy. It is a common experience to observe spontaneous remission in cases of polymyositis; the relationship of the improvement which occurred in Dr. Hart's cases to therapy with vitamin B was tenuous in the extreme. To adduce a specific deficiency of pyridoxine or of pantothenic acid or riboflavine as the cause of the patient's muscular weakness is presumptuous on the evidence which is presented to us. To go even further and to propose that the tumour cells compete for these vitamins seems quite unjustified. Much work remains to be done before the pathogenesis of the neurological and muscular disorders complicating malignant disease can be elucidated. The first essential, however, is accurate diagnosis of the lesion or lesions responsible for muscular weakness in each case. Once this has been achieved by biochemical and pathological means it may be possible to make some progress in identifying pathogenic mechanisms.—I am, etc.,

Boston, Mass. JOHN N. WALTON.

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1 *J. Amer. med. Ass.*, 1952, **150**, 844.
2 *Proc. roy. Soc. Med.*, 1953, **46**, 859.
3 Anderson, H. J., *et al.* (1953). *Lancet*, **2**, 1291.
4 Mackenzie, I. (1954). Ibid., **1**, 108.
5 Shafar, J. (1954). Ibid., **1**, 109.

Infectious Mononucleosis

SIR,—Dr. S. Shubert, Captain J. G. Collee and Dr. B. J. Smith's interesting article (*Journal*, March 20, p. 671) offers a good opportunity for re-emphasizing that the haematological picture, and *not* the agglutination test, is the mainstay of diagnosis in either the epidemic or the "sporadic" form of infectious mononucleosis. This is a fact that requires to be repeated again and again when statements such as "the laboratory let us down" are made, referring to the Paul–Bunnell test.

Regardless of whether one adopts the theory of one causal virus or of different closely related ones, the histological change in the lymphopoietic tissues, and the resulting peripheral blood count, are probably identical in all cases. Tidy,[1] in his remarkable exposé of glandular fever, reviewed the various clinical forms, to which one may add the very rare laryngeal form,[2] which I have also observed. Both his article and Whitby and Britton's classical textbook[3] contain comprehensive information on the value of blood changes and of serological findings in this disease. It has been variously estimated that roughly 10% of cases have a negative Paul–Bunnell test. This figure will undoubtedly be increased by observations of epidemics like the one described by Drs. Shubert, Collee, and Smith.

The differential white blood count appears to be the most constantly positive laboratory test in infectious mononucleosis, even before, or in the absence of, any glandular enlargement, the only exception being the prolonged febrile type of the disease. In this latter form of infectious mononucleosis, the laboratory tests will become diagnostic later on, at the time of the enlargement of the glands.[1] To be distinguished from infectious mononucleosis is a condition clinically simulating glandular fever with its enlargement of lymph glands, and sometimes recurring at intervals of

several weeks or months. The negative blood findings and negative lymph gland cytology (puncture!) will differentiate this condition of as yet unknown aetiology from infectious mononucleosis.

To summarize, I would like to make the following points: (1) the blood count is the most important test of infectious mononucleosis and is the most likely to reveal the diagnosis at an early stage and during the whole active phase of the disease; (2) the agglutination test (Paul–Bunnell test), if positive, is additional evidence; (3) a negative Paul–Bunnell test does not exclude this diagnosis; (4) a positive Paul–Bunnell test can sometimes be found after convalescence when the blood count might have become normal; and (5) negative haematological findings in the presence of glandular enlargement (especially if repeated) exclude the diagnosis of infectious mononucleosis.

In conclusion, I would like to say that it should be kept in mind that while the Paul–Bunnell test is a purely "technical" test the opinion on the blood film in difficult cases belongs in the domain of the expert.—I am, etc.,

Sheffield. S. VARADI.

REFERENCES

1 *British Medical Journal*, 1952, 2, 436.
2 Ravenna, P., and Snyder, J. (1948). *Ann. intern. Med.*, 28, 861.
3 *Disorders of the Blood*, 1953, p. 607. London.

Pethidine for Pain and Insomnia

SIR,—We have noticed that even the most up-to-date textbooks advocate morphine in cases of pain and insomnia associated with pneumonia. However, it has been our experience that when we have given even small doses of morphine, especially in people over the age of 40, the condition has deteriorated rapidly, with death in a very high percentage of cases.

On the other hand, since we have started using pethidine in similar cases the response has been noticeably better and the death rate has been very low. In our opinion, morphine is contraindicated in all cases of pneumonia, especially nowadays, as we have other drugs to relieve pain and help sleeplessness which are not so depressant on the respiratory centre.—I am, etc.,

R. G. B. WIGODER.
H. JEFFS.

London, S.E.6.

Single Incision for Bilateral Orchidectomy

SIR,—Like Mr. C. J. Cellan-Jones (*Journal*, May 1, p. 1039), my own memories go back to 25 years ago, when I learnt from Mr. Kenneth Walker to approach the testes directly through the scrotum. I have been doing so ever since without any of the complications he describes. So I must admit that, for my part, I took quite seriously Sir Heneage Ogilvie's plea for this approach (*Journal*, April 17, p. 934).—I am, etc.,

London, W.1. REYNOLD BOYD.

Chronic Vasomotor Rhinitis

SIR,—The two syndromes described by Mr. P. Reading and Mr. K. Malcomson and Dr. D. O'Neill and Mr. K. Malcomson (*Journal*, March 6, pp. 552 and 554) as "non-specific paroxysmal sneezing and rhinorrhoea" and "persistent nasal blockage" respectively are believed by the authors to respond differently to treatment. In the case of the former the symptoms are controlled by antihistamine drugs and sustained improvement follows psychotherapy, whereas the latter requires surgical intervention or zinc ionization. In my experience the two conditions frequently merge and the characteristic symptoms of the two states may alternate in a single individual. I am myself an example of such a "mixed" syndrome, all symptoms being promptly relieved by antazoline hydrochloride, 0.1 g.

The authors might find it of value to investigate how many of their cases had used the "pocket inhaler" in the past. The recent survey carried out by the City Analyst of Birmingham (*Journal*, March 13, p. 616) shows that while some of the inhalers examined were deficient in amphetamine others contained an excess of up to 30%. I attribute my own condition to the excessive use of such inhalers to relieve "catarrh," and the amount of amphetamine absorbed in this way was sufficient to cause sleeplessness, abolition of fatigue, and restlessness. A friend of mine in Calcutta, who was incapacitated for days by rhinorrhoea until he took antihistamine drugs, also blames the condition on to the excessive use of inhalers.—I am, etc.,

Udayagiri, India. D. STEWART MCLAREN.

Bacterial Endocarditis Due to Chromobacterium Prodigiosum

SIR,—Drs. A. J. Hawe and M. H. Hughes (*Journal*, April 24, p. 968) point out that Wilson and Miles were, in 1946, unable to quote any indubitable report contradicting the view that *Chromobacterium prodigiosum* was non-pathogenic for man. A patient died of septicaemia due to *Bacillus prodigiosus* in 1934 in a London teaching hospital, and the death certificate was lying on the desk of the local registrar of births and deaths when I went in to register the birth of a child. The registrar showed me the certificate (having found out that I was a doctor) and remarked that he had never heard of the condition. I told him that he was probably in the unique position of being the first to register a death from this cause, and I eagerly searched medical journals for some months in the hope that the case would be published. It apparently never was, which is a pity, as it would presumably have been the first of its kind.—I am, etc.,

London, W.1. J. C. HAWKSLEY.

SIR,—It may be of interest to Drs. A. J. Hawe and M. H. Hughes (*Journal*, April 24, p. 968) to draw their attention to a case of acute fatal septicaemia due to *Chromobacterium prodigiosum* which I published in the *Lancet* in 1935.[1] This was probably the first case of fatal infection with this organism ever published. The point of interest is that it was associated with agranulocytosis, and it seems possible that their case may have had chloramphenicol-induced agranulocytosis and developed endocarditis due to this organism only in the later stages of the illness.—I am, etc.,

Guildford. C. RICKWORD LANE.

REFERENCE

1 *Lancet*, 1935, 2, 20.

Racial and Religious Tolerance

SIR,—It is a sad reflection on the ability of the medical profession to think rationally that out of the fourteen advertisements for assistants in the *Journal* of April 10 seven implied preference for a particular race or religion. What does this imply? Does it imply that each of these doctors believes that a particular race or religion is more likely to supply a compatible colleague, or that it is easier to work with a person of one's own (or possibly not one's own) nation or creed? If this be so, have those concerned bothered to consider if their beliefs are founded on any rational judgment, or merely on emotionally toned prejudice? Do a significantly higher proportion of Scotsmen than Englishmen or Argentinians, for example, make better assistants even to other Scotsmen: do more Catholics than Jews? I have no figures available so am unable to formulate any conclusions lest they be based on prejudice. I think it is true to say that many beliefs of racial superiority or inferiority have been shown not to be founded on fact, and it would be reasonable to suggest that this may be so in this present case.

In any case I feel that a liberal-minded profession should be capable of putting aside emotionally toned judgments and accepting a colleague on his merits as "a good man to work with," irrespective of his race, colour, or creed. It should set an example in this disturbed world, where polls are necessary to decide on the allowable quantity of skin pigment in bus conductors, and abhor the discriminatory techniques so prevalent to-day.—I am, etc.,

Bristol. C. P. SEAGER.

Obituary

F. L. HOPWOOD, D.Sc.

Professor F. L. Hopwood, who died at Sidmouth, Devon, on May 2, had worked for many years in close association with the medical staff at St. Bartholomew's Hospital, as physicist, as professor of physics, and as vice-dean of the medical college.

Frank Lloyd Hopwood was born in 1884, and was educated at Hawarden Grammar School and at the University College of North Wales, Bangor. He then came to London, where he continued his studies at the Royal College of Science and at University College, taking the London degree of D.Sc. in 1919. Before graduating he worked during the first world war on the improvement of instruments for submarine detection and for underwater signalling, of which he invented a system. He became physicist at St. Bartholomew's Hospital in 1920, and was appointed professor of physics at the medical college there in 1924. He retired in 1949. London University then conferred on him the title of emeritus professor. He was also vice-dean of the medical college from 1939 to 1945.

Hopwood's contribution to radiotherapy was a most important one, for his hospital was one of the most progressive in this field. He published numerous papers in the *British Journal of Radiology*, the *Proceedings of the Royal Society*, and other journals, and he was a member of the Nuclear Physics Committee of the Medical Research Council. For many years also he served the British Empire Cancer Campaign as a member of its grand council and on many of its committees and subcommittees, and latterly as its honorary secretary. He was a past president and Silvanus Thompson Medallist and Memorial Lecturer of the British Institute of Radiology, an honorary member of the Faculty of Radiologists, and from 1925 to 1950 honorary secretary of the British Committee for Radiological Units. At the seventh International Congress of Radiology he was vice-president emeritus, having attended the previous Congress as a British delegate. The University of Cambridge conferred on him the honorary degree of M.A. in 1940, and in the same year he was elected an honorary Fellow of Queens' College, Cambridge.

He married Miss Helen Sproxton in 1909, and she survives him. There was one son of the marriage.

We are indebted to Professor A. WORMALL for the following appreciation: Frank Lloyd Hopwood retired in 1949 after 44 years of service happily and fruitfully devoted to the Medical College and Hospital of St. Bartholomew. Even in his retirement, however, there was no cessation of the work he loved so well, and right up to the end he continued to serve Bart's, the British Empire Cancer Campaign, and many other organizations in which he had a special personal interest.

The thousands of medical students who passed through his hands are not likely to forget him as a teacher and, above all, as a man who set a standard of personal and professional integrity which might be equalled but could not be surpassed. Many will for ever be grateful to him for his never-failing kind-heartedness and for the fatherly advice which he so readily gave them when they were in trouble. Those well acquainted with him knew that his opinion and advice were invariably sound, unbiased, and worthy of careful consideration, whatever the topic or the problem under discussion. A committee which had Hopwood as a member was unlikely to take any action which was either unwise or unfair.

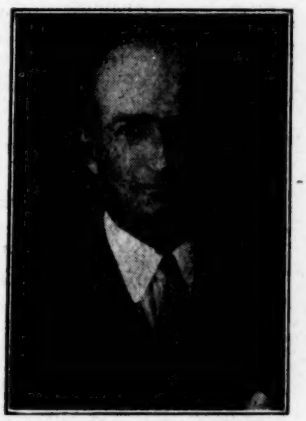
Many will remember the prominent part he took in helping to establish the million-volt x-ray unit at Bart's in 1936; others will recall his direct and always helpful interest in the Strangeways Institute at Cambridge, his submarine detection work in the 1914–18 war, or his early fundamental work on ultrasonics. Few people know that it was in his laboratory in 1934 that Szilard and Chalmers carried out the first chemical separation of an artificially produced radioactive isotope. His teaching and administrative duties were heavy, and frequent calls were made on his services for college and university committee meetings. There appeared, therefore, to be little time for him to carry out systematic research. It was characteristic of his real aptitude for research that during his retirement he published several important papers describing investigations which arose from observations he had made when using the kitchen tap and an ordinary household sieve. What an excellent director of a research institute he would have made, for rarely if ever did any researcher consult him without obtaining sound advice; and often he received real inspiration.

As a leader and as a man of wisdom and wide vision Hopwood was outstanding. These attributes received wide recognition when in September, 1939, he became vice-dean of our Medical College, with the task of looking after the preclinical departments during their wartime stay in Cambridge. How splendidly he performed this special duty is well known to his many friends at Bart's, Queens' College, and the Universities of Cambridge and London. I shall remember him particularly as a man of absolute integrity, a staunch colleague, a loyal and generous friend, and a delightful companion for a round of golf or a country walk, or at the lunch table. It was truly a privilege to have known him and to be blessed with his friendship.

J. L. LOVIBOND, T.D., M.D., F.R.C.P.

Dr. J. L. Lovibond, assistant physician at the Westminster Hospital, died suddenly on May 4, his 47th birthday.

John Locke Lovibond was born on May 4, 1907, and was educated at Oundle School, Christ's College, Cambridge, and the Middlesex Hospital, where, after qualification in 1932, he became casualty officer and house-surgeon to Mr. W. Sampson Handley. He then went to the Westminster Hospital as house-physician to the late Dr. Hildred Carlill and to Dr. W. E. Lloyd. In 1935 he took the M.R.C.P. and graduated M.B., B.Chir. at Cambridge, proceeding to the M.D. two years later, the subject of his thesis being hydrothorax in cardiovascular disease. After holding the post of house-physician at the Brompton Hospital, he returned to the Middlesex Hospital to work in the cardiographic department, and later became medical registrar to Dr. Cockayne. In 1938 he was appointed physician to the King George Hospital, Ilford, but had hardly taken up this appointment when war broke out in the following year. As a keen Territorial he was one of the first to leave. He served with the British Expeditionary Force in France, being one of the last to come through Dunkirk, and later in Iraq, Ceylon, and Burma. From officer in charge of a medical division, he became officer commanding the 35th British General Hospital



[*Lafayette, Ltd.*

in 1943 and, later, officer commanding the 38th British General Hospital in Burma, holding the rank of colonel. It was while serving in the R.A.M.C. that he was elected F.R.C.P. Towards the end of the war he became consulting physician to the 12th Army,, South-east Asia Command. On return to civilian life in December, 1945, he added to his previous appointments by becoming assistant cardiologist at the London Chest Hospital, Victoria Park, and, in 1948, assistant physician to Westminster Hospital.

We are indebted to Dr. F. DUDLEY HART for the following appreciation: "Jock" Lovibond had apparently been in perfect health and on the evening before his death had attended a medical committee meeting, where he showed his usual alertness and vigour. On the following day, although usually scrupulously punctual, he did not turn up for his teaching round at 2 o'clock, and the tragic news was heard a few minutes later. His death came therefore as a sudden and prostrating shock to all of us who had so recently seen his cheerful, alert figure.

Lovibond was a delightful man and his friends were not confined to one profession or school. Although keenly interested in cardiology, he was an excellent all-round general physician with a wide interest in all branches of medicine, as is shown by his varied publications dealing with diseases of the blood, of the colon, of the heart and lungs, and many other subjects. In 1938 he was the first to describe the "profile sign" as an early sign of clubbing of the fingers. Perhaps his most important publication was "Hydrothorax in Heart Failure," published in the *British Heart Journal* in 1941 and written in conjunction with Dr. D. Evan Bedford.

He had wide interests outside medicine. At the Middlesex Hospital he was captain of the first fifteen, and for many years he was a keen horseman, riding in many hunter trials, point-to-points, and following the hounds. He was a keen amateur painter and an able cartoonist, his caricatures adorning the pages of the *Granta* and the walls of the Westminster students' refectory. Some years ago, with a colleague, he built brick by brick his own country cottage. He retained his keen interest in the Army and was attached to the 1st Regiment, Honourable Artillery Company (R.H.A.). Indeed, two days before his death he had been on manœuvres on Salisbury Plain. As a colleague he was unfailingly kind, co-operative, and cheerful; we never saw him depressed or irritable. The deep sympathy of all his friends and colleagues goes out to his widow and mother in their tragic and sudden loss.

S. SPENCE MEIGHAN, M.B., F.R.F.P.S.

By the sudden death on April 20 of Dr. S. Spence Meighan Glasgow has lost one of her best-known ophthalmologists and the British Medical Association a member who was to have served as a vice-president of the Section of Ophthalmology at the Association's Annual Meeting to be held at Glasgow next July.

Stuart Spence Meighan was born at Glasgow on June 19, 1888, the son of the late Dr. T. Spence Meighan, and was educated there at the High School and at the University, where he graduated M.B., Ch.B., with honours, in 1912, having previously obtained the B.Sc. in 1909. He was elected F.R.F.P.S. in 1920. After qualifying he held resident appointments in Glasgow at the Western Infirmary, the Royal Hospital for Sick Children, and the Eye Infirmary, where his father had been a surgeon. Soon after the outbreak of war in 1914 he entered the R.A.M.C. and served in France with the Highland Field Ambulance in the 51st Division from 1916 until March, 1918, when he was taken prisoner. He was twice mentioned in dispatches.

After the war Dr. Spence Meighan returned to a junior staff post at the Glasgow Eye Infirmary, and soon afterwards became ophthalmic surgeon to Stobhill Hospital, then a Poor Law institution. He was promoted surgeon to the Eye Infirmary in 1926, and in the same year was appointed to the chair of ophthalmology at the Anderson College of Medicine, where he worked until 1943, when ill-health obliged him to resign. Later he became an honorary lecturer in ophthalmology in the University. At Stobhill, and at the Clydebank Eye Dispensary, he did much to extend the ophthalmic services available to the locality.

A member of the council and a vice-president of the Ophthalmological Society of the United Kingdom and a past-president of the Scottish Ophthalmological Club, he was keenly interested in all matters affecting his specialty. He was a member of the British Medical Association's committee on the diagnosis and certification of miners' nystagmus, the report of which was published in 1936. When the National Health Service began he was appointed a member of the Glasgow Northern Hospitals board of management and became chairman of its medical committee, a responsibility for which he was well suited. Dr. Spence Meighan had planned to read a paper before the Section of Ophthalmology at the Annual Meeting in July on trachoma in Glasgow, a subject on which he was an acknowledged expert. He was also particularly interested in the medico-legal problems of ophthalmic practice, and was often called to give evidence in courts of law.

Dr. Spence Meighan will long be remembered for his kindness both to his patients and to his colleagues, and for his readiness to help those who came to him for advice. His innate diffidence could not disguise his sound clinical knowledge and surgical skill. He regarded all his fellow men with an air of benevolence, and his sense of humour found an outlet in mimicry without malice, a gift which his friends enjoyed to the full. He is survived by a widow and two sons.

Dr. HARRISON STANFORD MARTLAND, the American pathologist, died in New York on May 1 at the age of 70. He was born in New York in 1883 and received his medical education at the College of Physicians and Surgeons, Columbia University, where he graduated in 1904. For the next four years he served as pathologist at the Russell Sage Foundation. In 1908 he was appointed city pathologist of Newark, New Jersey, a position which he held for 46 years. He was also chief medical examiner of Essex County. For many years he was professor of forensic medicine at the Postgraduate Medical School of New York University. Martland was a pioneer in the study of diseases due to radioactive substances. In 1925 he investigated the deaths of several girls who had been employed in painting luminous watch-dials and who had developed necrosis of the jaw and severe anaemia. He showed that these deaths were attributable to the habit the girls had of putting a point on the paint-brushes by wetting them on the lips and to the absorption of radioactive material in this way. His papers on this and related subjects were recently republished in book form by the U.S. Atomic Energy Commission, where Martland was employed for a time in designing protective devices against exposure to radioactivity. A proof of the regard in which Martland was held was forthcoming last January, when the thirteen-million dollar municipal hospital under construction at Newark was named the "Harrison S. Martland Medical Center." He was a member of the editorial board of the *American Journal of Surgery* from 1935 to 1946, when he was appointed associate editor.

Medico-Legal

ALLEGATIONS WITHDRAWN

[FROM OUR MEDICO-LEGAL CORRESPONDENT]

An action for negligence against the North-east Metropolitan Regional Hospital Board and Mr. Eric Edmund O'Malley, M.S., F.R.C.S., who had been surgical registrar of the Prince of Wales Hospital, Tottenham, came to an unusual end last week.[1]

The action was brought by Mrs. Storie in respect of the death of her husband, Mr. Lawrence Rodney Storie, a week after an operation for a varicose vein. In 1951 Mr. Storie had been successfully treated by Mr. O'Malley at the Prince of Wales Hospital for varicose ulcers, and doctor and patient had become friends. It was decided to operate for a varicose vein. The operation was performed on February 11, 1952, not by Mr. O'Malley but by the senior house-surgeon, and Mr. Storie was allowed to go home. On February 15 he was examined at hospital by Mr. O'Malley, and again allowed to go home and told to report on February 18. On February 18 he did so, but collapsed and died outside the hospital from a clot of blood 4 in. (10 cm.) long, which was found at necropsy in his heart.

The plaintiff's case was that on February 15 there was already gross sepsis at the site of the operation in the right groin, with enlarged glands which would have been palpable on examination, and that the clot had formed in the ligated vein, been dislodged by the sepsis, and travelled to the heart. It was alleged that Mr. O'Malley had made his examination so carelessly that he had failed to observe the signs of sepsis, and consequently failed to immobilize the patient to reduce the risk of dislodging a clot.

Mr. O'Malley's case was that he made a thorough examination during which he tested for the presence of a blood clot but found no sign of one, and found no sign of sepsis. From his examination he considered that Mr. Storie was going on absolutely as would be expected, and it would have been a bad thing to put him to bed.

The hospital board were joined as defendants on the ground that they were in law vicariously responsible for Mr. O'Malley's alleged negligence. No separate allegation of negligence was made against them.

The action was tried before Mr. Justice Stable and a jury, and at the end of a three-day hearing the jury, after an absence of over an hour, stated that they could not agree upon a verdict, and regretted putting the court to such inconvenience. Mr. Justice Stable, observing that it was not the court but the parties who would suffer, thereupon discharged the jury. On May 6, however, on the application of Mrs. Storie's counsel, the action was withdrawn.

In making the application to Mr. Justice Stable counsel said that, while he had been waiting outside court for the jury's verdict at the hearing, Mrs. Storie had told him that having heard the evidence she was satisfied that there was no ground for complaint against Mr. O'Malley. Mrs. Storie had instructed him so to inform Mr. O'Malley and to repeat it in public so as to clear him so far as she could. The action had not been brought irresponsibly at Mrs. Storie's instance, but on the strength of the medical evidence laid before her which turned out to have been founded on one or more false premises for which she was not to blame.

In allowing the application for the action to be withdrawn Mr. Justice Stable said that in the course of a fairly long legal experience he had not come across an example of such magnanimity as Mrs. Storie had shown in acknowledging that Mr. O'Malley did all and more that a really competent surgeon should have done. Mr. O'Malley emerged from the case with his professional reputation not only not impaired but enhanced. Not only was he a thoroughly competent surgeon, but a most kindly and friendly man.

The Medical Protection Society instructed Messrs. Le Brasseur and Oakley to act for Mr. O'Malley.

[1] *The Times*, May 7, 1954.

Medical Notes in Parliament

HEALTH SERVICE FINANCE

The Minister of Health, Mr. IAIN MACLEOD, speaking in a House of Commons debate on the Health Service on May 10, ranged over many aspects of the Service from the apportionment of capital expenditure for hospital needs to the cost of drugs and the standard of the general practitioner's surgery. He told the House that the Guillebaud Committee—engaged in a review of the finance of the Service—would begin the preparation of their report towards the end of June.

He commented that for the first time the true gross of the Health Service, at £505m., had exceeded £500m. The conclusion he ultimately reached was that, if one took medical need alone as the criterion, one could justify much greater expenditure—more, indeed, than any Chancellor could sanction or the country could stand. In his judgment the sum provided in the Estimates was enough. This was going to be a difficult year for hospital maintenance, but the sum allocated was £12,500,000 more than the out-turn last year, and that amount should enable them to hold the line, meet major needs, and make some modest advance. The capital outlook was a good deal more encouraging than it had been for some time. In the wider setting of national expenditure he was satisfied this year with the Estimates.

Less for Teaching Hospitals

Mr. Macleod said that he had deliberately allocated less in proportion to the teaching hospitals than to the regional hospital boards, since he felt there was more scope for economy in the teaching hospitals, and that it was right, within the limits of what was available, to be more generous to the regional boards. An analysis of the types of scheme that had been undertaken since the Service began until the end of last year showed that 20% of the money had been spent on ward accommodation, 17% on staff accommodation, 21% on special departments, 6% on out-patient departments; 4% on laundries and kitchens; 19% on engineering services, and 13% on others. It had been the consistent policy of successive Ministers to give high priority to special departments. If central allocations for capital expenditure were to be continued it would take away much of the autonomy and discretion of regional boards in the matter; and if the impression was given that funds would be made available for a particular service it would tend to make the boards think that as the matter was being taken care of centrally they need not bother to finance part of it out of their own budgets.

He had come to be regarded as the apostle of charges for the Health Service, but he was the only one of the four Ministers since its inception who had not introduced a Bill to impose those charges. Before the charges were made the cost of providing dentures had been running at about £2,750,000. It dropped almost at once to less than £1,500,000, and had remained fairly constant at that figure since.

It was immensely difficult to make a comparison between the numbers of prescriptions in different years, because so much depended on the prevalence of sickness. The figures for the first year of the Health Service charges were distorted by the London fog, the East Coast floods, and an influenza epidemic. The prescriptions dispensed now numbered about 213 million, compared with a peak of 225 million. The cost per prescription had turned down from a peak of 49d. to about 47½d. The cost to the Exchequer was £40m., against a peak of £45.5m., and the patients were paying £6.5m. If a Socialist Government should be returned to power he hoped they would think carefully indeed about some of these figures, and reflect that there might well be higher priorities on which to spend money than free laxatives and free vitamin pills.

Delivery dates of artificial limbs had considerably improved, and delays in repairs had also been reduced.

Some Drugs too Dear

Investigations had been made into the cost of basic drugs in four categories—antibiotics, vitamins, hormones, and insulin—and proprietary preparations. During the investigation the prices of penicillin and hormones had been reduced by the manufacturers. In the basic drugs he was conscious of the danger of interfering with valuable research, and also of the importance of the export trade, because there was no question that risks had to be taken by the manufacturers.

Without prejudice to final action the Ministry decided last year to make a number of investigations into the cost of manufacturing certain proprietaries which would seem at first sight to be especially expensive. In categories 2, 3, and 4 there were 6,000 preparations of which they were investigating 91, which accounted for 30% of the total cost of proprietaries to the Health Service and 18% of the total drug bill. In one group investigations were complete. They had not been able to reach agreement with the manufacturers on what they considered a reasonable profit level, and proposed soon to advise doctors that satisfactory price arrangements had not been made and to ask them not to prescribe these preparations.

More Partnerships

In the 12 months ending July, 1953, the number of doctors in partnership increased by more than 1,000, or 3.6%. Of the doctors newly admitted to established partnerships, 555 were known to have been assistants in the practices in which they became partners, which was a welcome development. A substantial proportion of the doctors entering the Service in 1952–3 went into under-doctored urban areas, with the result that the proportion of the urban population in under-doctored areas fell from 60% in October, 1952, to 46% in July, 1953.

Speaking of accommodation and surgeries, he said that as part of a doctor's terms of service he was required to provide proper and sufficient surgery and waiting-room accommodation for his patients. There could be no justification whatever, now that the Danckwerts award had been promulgated, for that not being done up to a reasonable standard. Last October the chairman of the General Medical Services Committee of the B.M.A. drew the attention of all general practitioners to this matter in a letter, and urged the highest possible standard.

On health centres and group practice, he said the report of Sir Henry Cohen's committee was in his hands and would be published soon. People held very different views about the future of the health centres. Another matter which they must seek to develop in the general-practitioner service was that they should have as much help as possible from *x*-ray and "path" examinations in the hospitals. A good deal of opportunity was being given, and he was certain that it provided a genuine incentive to the keen practitioner. In spite of the difficulties of providing such a direct service, he was told that about half the hospitals with these facilities had made them generally available to the general practitioners.

It was not right that they should look for spectacular changes in the structure of general practice, but they could draw encouragement from the figures he had given and the beginnings of the implementation of the Working Party report. There was great interest in this, and some interesting studies—by Dr. Hadfield,[1] of the B.M.A., and by Dr. Stephen Taylor—helped to encourage that interest. A quotation from Dr. Taylor's book summed up what he had to say about general practitioners and the provision of accommodation: "There is no impossibility about raising the standards of practice of the less good doctors to those of the best, providing that what happens in the best practices is made known to all." That was an accurate reflection of the position.

[1] *British Medical Journal*, September 26, 1953, p. 683.

Opposition's Views

Mr. A. BLENKINSOP (Newcastle-upon-Tyne, East, Lab.), who opened the debate, said that many people had feared that the Guillebaud Committee would be used for the introduction of spot interim recommendations which might have a seriously detrimental effect on the work of the Service. Since then it had become clear that the committee was being given opportunities and time to study the subject carefully and fully. The Opposition welcomed this. They were certain that, the more fully the committee investigated, the more they would be convinced that true economy would demand increased rather than reduced expenditure. (Opposition cheers.)

Recently medical officers of health in speeches at congresses had given a misleading account of the hospital service. One well-known officer had said that no progress had been made since 1948. That was demonstrably false. Great advances had been made, although in some cities, which were particularly fortunate in the past, the same rate of progress had not been maintained as in other areas. It was misleading for men in responsible public positions to attempt to give the impression to the public that because they had lost some contact with hospital development this had meant a complete setback in development generally.

This year the Estimates provided for an increase in the capital allocation to hospitals of 25% over the allocation for last year, but what a miserable total was disguised by the percentage! (Opposition cheers.) It was an increase of only £2m. over the £8m. allocation of last year, and it only brought the allocation nearly back to what it was in the Estimates for 1951–2. It only partly redressed the severe cuts made a year ago, and would in no way meet the needs of the hospital service.

The majority of doctors' practices were good, but a serious proportion were bad. It was a tragedy that those doctors were getting the advantage of payments to which they had no right. Nobody could make him believe that in those shocking practices anything like 38.7% was being spent on expenses. The Service was being swindled and contumely brought on other doctors who maintained a good standard of provision. Premises should be inspected, and some of the worst offenders warned that unless there was some improvement they could no longer be regarded as practising in the Health Service.

Improvements in Hospital Service

Mr. SOMERVILLE HASTINGS (Barking, Lab.) said there had been a great improvement in the hospital service, which had been most marked in the medical treatment in the small ex-Poor-Law hospitals in country districts. The general-practitioner service had provided great benefits for the families of the employed, but there had been complaints. Certain people who were accustomed to "send for the doctor" for almost anything, in the same way that they sent for the plumber or the sweep, had found that they were not getting the same attention—for the very good reason that the practitioners were busy dealing with more important cases. The Minister's action in allocating a percentage of beds in general hospitals for tuberculosis cases had shown the advantage of the unity of control bestowed by the Health Service Act, and the result had been that the waiting-lists had become much smaller. He doubted whether preventive medicine had improved to the same degree as curative medicine, and for that the doctors were largely to blame. He also said that consultants should no longer be paid travelling time and expenses. It encouraged them to dissipate their energies by going to too many hospitals.

Dr. BARNET STROSS (Stoke-on-Trent, Central, Lab.) said that if we had to face an atomic war large stocks of antibiotics, blood, and dried plasma should be available.

General practitioners, he said, should be the first line of attack against disease. More use should be made of them than had been in the past. For them to work in isolation was wrong, particularly in the cities, where group practice

was the best. There were sufficient general practitioners and consultants if they were properly distributed.

Colonel M. STODDART-SCOTT (Ripon, Con.) said that the time had come to consider whether the regional hospital boards in England were the best organization for the Health Service. The first form of organization was not necessarily the best, and it should now be decided either to abolish them completely or to reduce their power and influence, at the same time raising the standard of the management committees.

Mr. R. FORT (Clitheroe, Con.) referred to the importance of the general practitioner, and said that this had been brought out by two remarkable publications—the book by Dr. Stephen Taylor and the issue of the *British Medical Journal* last September which included Dr. Hadfield's survey of several hundred general practitioners and the results of his postal inquiry. One difficulty was the increasing specialization which was required, but there was a need for the various branches of the medical profession to work closer together. It was disappointing to find that, according to the article in the *British Medical Journal*, consultants were failing to have general practitioners present at consultations as much as was the case before the Health Service started. It would be well to bring to the notice of specialists how important it was to keep their general practitioner colleagues working side by side with them.

Commander T. GALBRAITH, Under-Secretary, Scottish Office, replying to the debate, said that any practitioners who wished to incur capital expenditure on the provision of premises for group practice were invited to apply for interest-free loans from the £100,000 which had been set aside from the national pool for the development of group practice. Decisions on applications—which were only now coming in—would be taken by a joint committee, one in England and Wales and the other in Scotland, composed of representatives of the general body of practitioners on the one hand and of the appropriate health department on the other. The Government had no rigid preconceived notions on what, for this purpose, constituted group practice, but the committee would endeavour to select those which held out most promise of improving the standard of service which the group of doctors would be able to offer their patients. These loans would be repayable normally over 10 years and the money repaid would become available for further loans. The health centres which had been set up were for experimental purposes, and it would be best to await developments and see how they were serving their purpose. A great deal could be done by group practice and by the doctors themselves.

Hospital Waiting-lists

Dr. BARNET STROSS (Stoke-on-Trent Central, Lab.) asked the Minister of Health whether he had noted the variation in the average waiting time, after inclusion in the waiting-list, for patients who required major surgery for tuberculosis, cancer of lung and bronchus, or bronchiectasis, and what he proposed to shorten the waiting time, particularly in Wales. Mr. IAIN MACLEOD replied on May 6 that the length of waiting time was due primarily to the rapid increase in demand for thoracic surgery and the comparative shortage of thoracic surgeons and trained theatre staff. The number of surgeons had increased by 50% over the past three years, and was likely to increase further, and the annual number of patients dealt with by thoracic surgery departments rose by over 18% in 1953 and had nearly doubled since 1949.

Dr. STROSS said that in Wales the waiting period for tuberculosis before treatment was offered was up to two years, and for bronchiectasis up to five years. Would the Minister increase the number of consultants for this specialty? Mr. MACLEOD said they were doing all they could to iron out the serious discrepancies between the regions. One method was by consultation between senior assistant medical officers to see whether one region could help another. Mr. SOMERVILLE HASTINGS (Barking, Lab.) suggested the concentration of cases in need of chest surgery in a relatively large hospital, so that so much time was not wasted by surgeons travelling from one hospital to another, and better work could be done because of the treatment that trained staff could give. Mr. MACLEOD observed that that was a far-reaching proposal and he would like to consider its implications.

Use of Pay-beds

Mr. SOMERVILLE HASTINGS (Barking, Lab.) asked the Minister of Health on May 6 what percentage of Section V pay-beds were unoccupied in the hospitals under his direction during each of the last three years. Mr. IAIN MACLEOD replied that no figures were available before July, 1952. For the periods July to December, 1952, January to June, 1953, and July to December, 1953, the figures for non-mental hospitals were 34.5, 30.4, and 34.5 respectively. Mr. HASTINGS commented that the figures showed a terrible waste of beds. Large numbers of non-paying patients could use those beds if the Minister would so instruct. Mr. MACLEOD said that he did that last August, and the results of that were not apparent in these figures. He hoped that it would substantially reduce the percentage of non-occupied beds.

Hospital Out-patients

Mr. GEORGE JEGER (Goole, Lab.) asked the Minister of Health whether he had given consideration to the question of reducing waiting time in hospital out-patients' departments, and what action he had taken. Mr. IAIN MACLEOD stated on May 6 that, as he had previously said, he regarded this as a matter which was primarily one for local action by the hospital authorities themselves. He was, however, proposing to ask them to review their present arrangements. He was not convinced that they could do very much by circular; a great deal more could be done by the pressure of public opinion in the different areas. He would consider a suggestion that the Central Health Services Council should be asked to make a survey of the out-patient problem.

Hospital Board Appointments

The MINISTER OF HEALTH was asked on May 6 why he had not reappointed Dr. Stark Murray to the South-West Metropolitan Hospital Board. He replied that in making this and other changes he had followed the example of his predecessors in introducing new members at regular intervals, so as to widen the opportunities for service on the boards.

Mr. H. KING (Southampton, Test, Lab.) said this doctor had been one of the most able and conscientious members of a very good board. It was a bad thing to terminate the appointments of excellent men merely because they had been six years on a board. Above all, could the Minister assure the House that political considerations did not enter this matter, as Dr. Stark Murray was a leading Socialist doctor and his successor was a leading anti-Socialist doctor? Mr. IAIN MACLEOD said that if Mr. King would look at the appointments to this and other boards he would know that there was no foundation for his suggestion.

Colonel M. STODDARD-SCOTT (Ripon, Con.) asked about the appointments of M.P.s to the boards, and the parties to which they belonged. Mr. MACLEOD said the original appointments included six M.P.s, a number subsequently increased to nine, and by a strange coincidence all nine were Socialists.

Dr. EDITH SUMMERSKILL (Fulham West, Lab.) asked whether the Minister knew that this very able doctor was a founder-member of the Socialist Medical Association. Mr. MACLEOD: "I appoint people for medical and not political considerations." Mr. PETER SMITHERS (Winchester, Con.) asked by whom Dr. Stark Murray had been succeeded, and Mr. MACLEOD said it was Mr. Lawrence Abel, one of the finest surgeons in the country.

Tuberculous Immigrants

Mr. KENNETH ROBINSON (St. Pancras North, Lab.) asked the Minister of Health on May 6 if he had any statement

to make concerning the problem of persons from abroad taking up residence in this country while suffering from active tuberculosis. Mr. IAIN MACLEOD stated that the Central Health Services Council had recommended that appropriate action be taken to ensure that those seeking work in this country from abroad should be free from infectious tuberculosis. The Standing Tuberculosis Advisory Committee, on the other hand, had expressed the view that the position did not indicate a serious menace to the health of the country. Special inquiries that had been made suggested that the number of those entering with active tuberculosis was very small indeed.

Mental Nursing Recruitment

Miss PAT HORNSBY-SMITH, Parliamentary Secretary to the Ministry of Health, replying to an adjournment debate on May 3 about the shortage of mental nurses and the action taken to encourage recruiting, told the House of Commons of the improved wages rates that had been recommended after arbitration and were now before the Whitley Council. The Ministry had launched a series of 36 publicity campaigns. It was too early to assess results. The Minister regarded this subject as of top priority, and no effort in aid and encouragement within their power would be spared to get open non-staffed beds and thereafter to provide the staff for new beds.

Scottish Hospital Board.—During the past two years, according to a reply given on May 3 by the Secretary of State for Scotland, 13 persons had ceased to be members of the South-East Scotland Regional Hospital Board and five new appointments had been made. Those who have left the board include Dr. E. A. Cormack (Edinburgh), Dr. A. Simpson (Hawick), and Sir Henry Wade (Edinburgh). The new members include Dr. J. C. G. Mercer (North Berwick), Professor G. H. Percival (Edinburgh), and Dr. G. J. Summers (Edinburgh).

Welfare Milk.—The Minister of Food stated on May 3 that on October 31 a new system of welfare milk based on weekly tokens would be introduced.

Vital Statistics

Occupational Mortality

The deaths in England and Wales in 1950 have been analysed in relation to the 1% sample already tabulated from the 1951 census to provide some preliminary figures on occupational mortality.[1] Only broad groups of occupation are listed; the medical profession is not among them. As a basis of comparison standardized mortality ratios are given in Tables I and II below, extracted from the Registrar-General's tables. These S.M.R. figures are to be compared with the figure of 100 for the total population analysed in each Table, and they illustrate relative, not absolute, differences.

Table I below, concerned with men aged 20–64, shows that there are well-marked gradients upwards in social classes I to V for deaths from chronic rheumatic heart disease, pneumonia, and ulcer of stomach, whereas a reverse gradient is shown for cancer of the intestine and coronary heart disease.

Figures for married women aged 20–64, analysed by the same causes of death and the social class of their husbands, are given in Table II below.

TABLE I

Causes	Social Class I	II	III	IV	V
Malignant neoplasms, all sites	96	84	105	94	110
Stomach	57	67	100	114	132
Intestines	*123*	100	105	85	94
Lung, bronchus, trachea	80	79	108	89	116
Chronic rheumatic heart disease	*61*	87	103	102	114
Arteriosclerotic (coronary) heart disease	150	110	104	79	89
Pneumonia	*43*	63	97	106	157
Ulcer of stomach	*56*	81	97	99	144
Ulcer of duodenum	*104*	78	106	82	126

TABLE II

Causes	Social Class I	II	III	IV	V
Malignant neoplasms, all sites	115	90	103	95	107
Stomach	*57*	72	101	106	138
Intestines	*103*	100	97	104	106
Lung, bronchus, trachea	*120*	94	104	96	91
Chronic rheumatic heart disease	63	62	102	118	135
Arteriosclerotic (coronary) heart disease	92	93	101	100	108
Pneumonia	*69*	75	98	110	138
Ulcer of stomach	*(60)*	*93*	96	*124*	*100*
Ulcer of duodenum	*(100)*	*68*	*91*	*133*	*131*

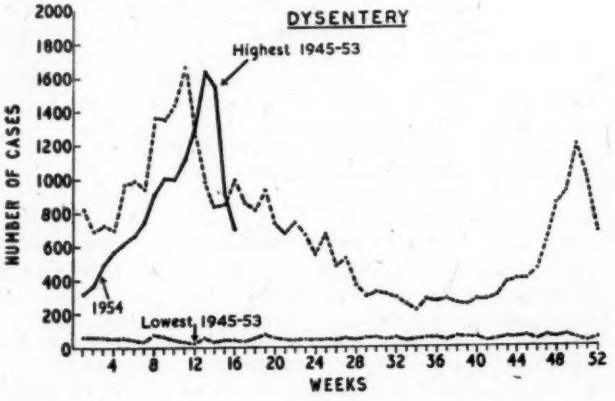
In Tables I and II figures in italics are based on fewer than 50 deaths, figures in parentheses on fewer than 10 deaths.

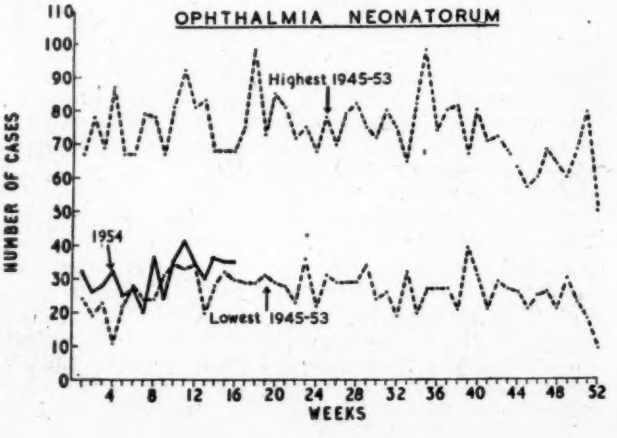
[1] *Registrar-General's Decennial Supplement: England and Wales, 1951. Occupational Mortality, Part I.* H.M.S.O. 7s. 6d.

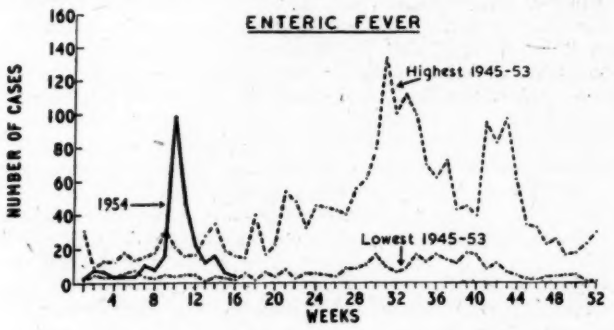
The infant mortality rate, being the number of deaths in infants aged under 1 year per 1,000 live births, increased through social classes I to V. In 1950 the rate was 17.9 for social class I, 22.5 for II, 28.4 for III, 34.5 for IV, and 41.1 for V; for all classes it was 29.9. The maternal mortality rate also increased by social class, figures for 1950 per 1,000 legitimate live and stillbirths being as follows: 0.77 for social class I, 0.82 for II, 0.80 for III, 0.90 for IV, and 0.93 for V; for all classes it was 0.83.

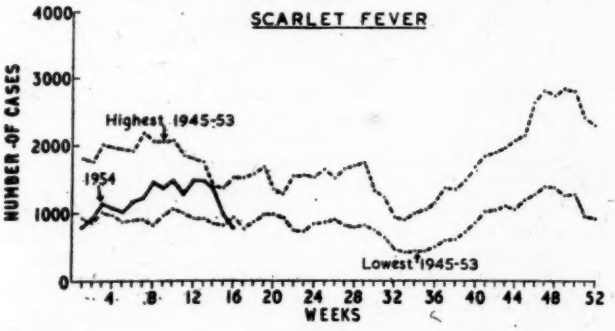
Graphs of Infectious Diseases

The graphs below show the uncorrected numbers of cases of certain diseases notified weekly in England and Wales. Highest and lowest figures reported in each week during the nine years 1945–53 are shown thus - - - - - -, the figures for 1954 thus ————. Except for the curves showing notifications in 1954, the graphs were prepared at the Department of Medical Statistics and Epidemiology, London School of Hygiene and Tropical Medicine.









Infectious Diseases

The largest variations in the returns of infectious diseases in England and Wales during the week ending April 24 were decreases of 208 for dysentery, from 919 to 711, and 205 for scarlet fever, from 994 to 789, and increases of 284 for measles, from 1,912 to 2,196, and 153 for whooping-cough, from 1,980 to 2,133.

Small falls in the incidence of scarlet fever were recorded in every region; the largest decline was 31 in Yorkshire West Riding, from 107 to 76. The largest increases in the number of notifications of measles were 104 in Cheshire, from 87 to 191, 64 in Norfolk, from 308 to 372, and 36 in Yorkshire West Riding, from 185 to 221, and the largest decrease was 30 in Staffordshire, from 215 to 185. 12 cases of diphtheria were notified, being 2 fewer than in the preceding week. The chief feature of the returns of diphtheria was a rise from 2 to 7 in Lancashire, where 4 cases were notified in Liverpool C.B. The largest variations in the trends of whooping-cough were rises of 33 in Sussex, from 45 to 78, 31 in Lancashire, from 190 to 221, and a fall of 35 in Kent, from 161 to 126.

10 cases of acute poliomyelitis were notified. These were 4 fewer for paralytic and 3 fewer for non-paralytic cases than in the preceding week. The only counties with 2 cases were Somerset and Yorkshire West Riding.

For the third consecutive week the number of notifications of dysentery has fallen and the total is now less than half of that of three weeks earlier. The largest centres of infection were Lancashire 138 (Denton U.D. 47, Manchester C.B. 13, Salford C.B. 12, Bolton C.B. 10), London 91 (Islington 26, Lewisham 20), Yorkshire West Riding 81 (Sheffield C.B. 19, Bradford C.B. 16, Dewsbury C.B. 16), Leicestershire 42 (Leicester C.B. 35), Middlesex 37 (Edmonton M.B. 16), Glamorganshire 34 (Llwchwr U.D. 16), Gloucestershire 31 (Bristol C.B. 25), Kent 27, Essex 24, and Warwickshire 20 (Birmingham C.B. 19).

In Scotland the number of notifications of dysentery increased by 78, from 273 to 351. The largest returns were 196 in Glasgow, 65 in Lanark county, 21 in Edinburgh, and 21 in Dundee.

Week Ending May 1

The notifications of infectious diseases in England and Wales during the week included pneumonia 521, scarlet fever 623, whooping-cough 2,233, diphtheria 12, measles 1,970, dysentery 759, acute poliomyelitis 20, paratyphoid fever 3, and typhoid fever 3.

INFECTIOUS DISEASES AND VITAL STATISTICS

Summary for British Isles for week ending **April 24** (No. 16) and corresponding week 1953.

Figures of *cases* are for the countries shown and London administrative county. Figures of *deaths* and *births* are for the 160 great towns in England and Wales (London included), London administrative county, the 17 principal towns in Scotland, the 10 principal towns in Northern Ireland, and the 14 principal towns in Eire.

A blank space denotes disease not notifiable or no return available.

The table is based on information supplied by the Registrars-General of England and Wales, Scotland, N. Ireland, and Eire, the Ministry of Health and Local Government of N. Ireland, and the Department of Health of Eire.

CASES in Countries and London	1954					1953				
	Eng. & Wales	Lond.	Scot.	N. Ire.	Eire	Eng. & Wales	Lond.	Scot.	N. Ire.	Eire
Diphtheria	12	0	3	1	0	25	0	5	0	
Dysentery	711	91	351	2	1	419	53	67	8	
Encephalitis, acute	3	1	0	0		6	0	0	0	
Enteric fever: Typhoid	1	0	0	0	0	2	0	2	0	1
Paratyphoid	3	0	1	0	0	8	1	1 (B)	0	
Food-poisoning	85	8		0		88	12		0	
Infective enteritis or diarrhoea under 2 years				8	15				13	18
Measles*	2,196	93	184	115	405	13,731	629	568	243	168
Meningococcal infection	34	2	11	3	4	44	5	25	5	1
Ophthalmia neonatorum	35	3	7	0		30	1	4	1	1
Pneumonia†	478	32	204	9	5	681	35	223	20	8
Poliomyelitis, acute: Paralytic	6	0	3	0	0	34	8	2	0	1
Non-paralytic	4	0				7	0			
Puerperal fever§	232	36	14	3		220	33	21	1	
Scarlet fever	789	58	122	32	35	1,047	63	165	35	83
Tuberculosis: Respiratory	706	81	148	30				163	27	
Non-respiratory	113	7	31	3				28	7	
Whooping-cough	2,133	63	314	31	25	3,206	237	429	41	149

DEATHS in Great Towns	1954					1953				
	Eng. & Wales	Lond.	Scot.	N. Ire.	Eire	Eng. & Wales	Lond.	Scot.	N. Ire.	Eire
Diphtheria	0	0	0	0	0	0	0	0		0
Dysentery	1	0		0		0	0			
Encephalitis, acute		0			0		0			0
Enteric fever	1	0	0	0		0	0	0		
Infective enteritis or diarrhoea under 2 years	6	1	2	1	2	11	0	1	3	0
Influenza	12	3	3	1	1	23	2	2	0	2
Measles			0	0	1		0	1		0
Meningococcal infection		0	0				1	1		
Pneumonia	197	23	22	20	7	213	38	22	12	6
Poliomyelitis, acute	1	0			0	2	1			0
Scarlet fever		0	0	0	0		0	0		0
Tuberculosis: Respiratory	96	16	10	6	6	113	17	14	0	11
Non-respiratory			1	0	1		3	2	0	3
Whooping-cough	1	0	0	0	0	1	0	0	0	0
Deaths 0–1 year	218	32	26	10	28	239	30	30	10	20
Deaths (excluding stillbirths)	5,218	768	612	155	171	5,273	758	606	132	201
LIVE BIRTHS	7,552	1111	1101	228	441	7,874	1172	971	272	407
STILLBIRTHS	185	26	24			217	30	25		

* Measles not notifiable in Scotland, whence returns are approximate.
† Includes primary and influenzal pneumonia.
§ Includes puerperal pyrexia.

Medical News

Royal College of Physicians of London.—The following were elected Fellows of the College on April 29: M. K. Gray, M.B. (New Zealand), I. G. Davies, M.D. (Leeds), E. T. D. Fletcher, M.D. (London), O. E. J. Murphy, M.B. (Australia), C. L. Stote, M.D. (Shrewsbury), L. G. Bell, M.D. (Canada), H. M. Rennie, M.B. (Australia), R. Whishaw, M.B. (Tasmania), A. C. E. Cole, M.D. (Tanganyika), E. C. Allibone, M.D. (Leeds), H. B. May, M.D. (London), E. M. Darmady, M.D. (Havant), H. A. Dewar, M.D. (Newcastle-upon-Tyne), J. M. Holford, M.B. (Royal Navy), A. P. Dick, M.D. (Cambridge), D. H. G. MacQuaide, M.D. (Northampton), J. Carson, M.B. (Bamford in the Peak), Raymond Greene, D.M. (London), R. J. G. Morrison, M.D. (Royal Army Medical Corps), Georgiana M. Bonser, M.D. (Leeds), C. E. Dent, M.D. (London), J. M. Naish, M.D. (Iron Acton, near Bristol), T. N. Morgan, M.D. (Aberdeen), K. S. MacLean, M.D. (London), J. Lowe, M.D. (London), A. P. Norman, M.D. (London), J. H. Paterson, M.D. (Sidcup), G. MacG. Bull, M.D. (Belfast), L. G. Blair, L.R.C.P. (London), R. Kirk, M.D. (Sudan), D. V. Hubble, M.D. (Derby), A. P. Murphy, M.D., P.R.A.C.P. (Australia), Sir Eric D. Pridie, M.B. (London), H. E. Sigerist, M.D. (Switzerland).

Seventh World Health Assembly.—Dr. M. G. Candau, Director-General of W.H.O., said when he addressed the Assembly on May 3 that the policy of decentralizing W.H.O.'s work had proved to be fully justified. In determining priorities for requests for aid, they took account first of whether the project would raise the general health standards of the country concerned. They had also to be certain that the work would be carried on and completed by the government of the country. Member countries, he said, could depend more and more on W.H.O. for assistance in improving their epidemiological services and their health statistics. They could also rely on W.H.O. to keep them informed of progress made in the scientific aspects of medicine.

Dr. J. N. Togba, of Liberia, has been elected president of the W.H.O. in succession to Dr. M. Khater, of Syria.

Professor G. Macdonald, of the London School of Hygiene and Tropical Medicine, has been awarded the W.H.O.'s Darling foundation prize jointly with Dr. G. R. Coatney, of the U.S.A. The prize consists of a medal and 1,000 Swiss francs.

Board of Registration of Medical Auxiliaries.—The first dinner of the Board was held at Apothecaries' Hall on May 4, with the president, Mr. A. M. A. Moore, in the chair. In proposing the health of the Board Sir Russell Brain, P.R.C.P., said that medical auxiliaries were an integral part of medicine and should not be looked on just as additions to medicine. The existence of the Board showed that the auxiliaries, being part of medicine, shared its ideals and sought to maintain the same high standards of skill, ethics, and professional pride. There must be co-operation not only with the profession, but among themselves. In reply Mr. Moore traced the history and development of the Board. The first move was begun in 1928, when the Representative Body of the B.M.A. resolved that, in view of the risk to the public from the use of electricity and radiation in treatment by untrained and unqualified persons, suitable courses of training should be organized under medical direction, and that those who had satisfactorily followed such a course should be entitled to have their names on an approved scroll. In 1929 the Council of the B.M.A. decided that the only method of carrying out the wishes of the Representative Body was by means of voluntary action, the most satisfactory solution being the institution of a voluntary register. This register came into being in 1930. In 1933 the Representative Body approved the establishment of a register of auxiliary medical services, and in 1936 the Board was incorporated under the presidency of Sir Henry Souttar, the founder members being the B.M.A., the Society of Apothecaries, the Chartered Society of Physiotherapy, and the Society of Radiographers. Subsequently recognition was given to orthoptists, speech therapists, dietitians, and more recently to operating theatre technicians. Recognition was given only after the fullest investigation of the standards of education, training, and examination of the body concerned. The main function of the Board was to publish sectional registers of each of the qualifying bodies registered with it, and it was hoped before long that a comprehensive register would be brought out. One of the main objects of the Board was to promote legislation for the establishment of a statutory register. The Cope Report, which was published in 1951, recommended a degree of statutory registration for medical auxiliaries employed in the N.H.S. and for the registration of others not so employed if they desired it. In 1953 the Minister of Health stated in the House of Commons that there was insufficient agreement on fundamental matters to proceed with statutory registration on the lines proposed by the Cope committees. The Minister had now appointed a working party with a view to evolving a scheme acceptable both to the Minister and to the auxiliaries. Mr. Moore paid a tribute to the many persons who had played an important part in the development of the Board's work. The health of the guests was proposed by Mr. John Hanby, President of the Society of Chiropodists, and responded to in a delightful speech by Sir Heneage Ogilvie.

Availability of Cortisone.—The Board of Trade will issue import licences for cortisone or A.C.T.H. in response to applications made by or on behalf of patients who need these drugs for their personal use. The application must be accompanied by a medical certificate stating the condition from which the patient is suffering and the quantity and form of cortisone or A.C.T.H. required for treatment. The patient should send the medical certificate with a request for form ILB/A (Revised) to the Import Licensing Branch, Romney House, Marsham Street, London, S.W.1.

Rehabilitation Inquiry.—Anyone wishing to give evidence to the Committee of Inquiry on the Rehabilitation of Disabled Persons should submit it as soon as possible, and before June 30, to the joint secretaries of the committee at the Ministry of Labour and National Service, 32, St. James's Square, London, S.W.1.

Drummond Memorial Fellowship.—A fund has now been raised in memory of the late Sir Jack Drummond, and though donations are still coming in the trustees want to appoint a Fellow on October 1. The intention is to award a fellowship to "a young scientist of proved ability to engage in research on nutrition, with special emphasis on human nutrition." Appointment would be for one year at first with a stipend at the rate of £900 per annum. The trustees would consider extending it. The trustees have sent a letter to the heads of departments of appropriate institutions seeking help in the appointment of a Fellow.

The Medical World for April is a special issue devoted to smoking and cancer of the lung, containing a symposium of professional opinion on this subject.

COMING EVENTS

British Association of Sport and Medicine.—The next meeting, a symposium on athletic injuries and their treatment, will be held on May 24 in the Meyerstein Theatre of the Westminster Hospital Medical School, Horseferry Road, London, S.W.1. Details from the honorary secretary, 95, Mount Street, London, W.1.

Sir Howard Florey, F.R.S., will deliver the Croonian Lecture to the Royal Society on May 27 at 4.30 p.m. His subject will be "Mucins and the Protection of the Body."

Friends of Vellore.—A public meeting will be held at Caxton Hall, London, S.W.1, on May 27 at 7.30 p.m. The speakers will be Dr. Hilda M. Lazarus, Sir Samuel Runganadhan, and Dr. Howard Somervell. Further information may be obtained from the secretary, Mr. R. Chamberlain, Annandale, North End Road, London, N.W.11.

SOCIETIES AND LECTURES

A fee is charged or a ticket is required for attending lectures marked ●. Application should be made first to the institution concerned.

Monday, May 17

INSTITUTE OF PSYCHIATRY.—5.30 p.m., lecture-demonstration by Dr. E. Stengel.

LONDON UNIVERSITY.—At Guy's Hospital Medical School, 5.30 p.m., first of two lectures by Dr. Bernard B. Brodie (National Heart Institute, Bethesda, U.S.A.): Biochemical and Clinical Implications of Studies in Drug Metabolism.

POSTGRADUATE MEDICAL SCHOOL OF LONDON.—4 p.m., Dr. N. F. Coghill: Sigmoidoscopy in Medicine.

Tuesday, May 18

ILFORD MEDICAL SOCIETY.—At King George Hospital, Ilford, 8.45 p.m., annual general meeting. Dr. H. N. Rose: Medical Administration.

INSTITUTE OF DERMATOLOGY.—5.30 p.m., Dr. L. Forman: Lupus Erythematosus.

SOUTH-WEST LONDON MEDICAL SOCIETY.—At Bolingbroke Hospital, Wandsworth Common, S.W., 8.30 p.m., Dr. Paul Wood: The Physician's Approach to Cardiac Surgery.

WRIGHT-FLEMING INSTITUTE OF MICROBIOLOGY.—5 p.m., Almroth Wright Lecture by Dr. W. Hayes: Nature of Genetic Recombination in *Bacterium coli*.

Wednesday, May 19

ASSOCIATION OF OPTICAL PRACTITIONERS.—At London School of Economics and Political Science, 8 p.m., 26th Ettles Memorial Lecture by Mr. S. M. Wells, F.S.M.C., D.Orth.: Visual Problems of the Older Worker in Industry (illustrated).

INSTITUTE OF DERMATOLOGY.—5.30 p.m., Dr. H. Haber: Histology of Some Skin Conditions in Children.

INSTITUTE OF LARYNGOLOGY AND OTOLOGY.—5.30 p.m., Dr. I. Friedmann: Malignant Granuloma of the Nose.

●INSTITUTE OF OBSTETRICS AND GYNAECOLOGY.—At Hammersmith Hospital, 3 p.m., Dr. Mary Barber: Investigation of Sepsis in a Maternity Unit.

LONDON UNIVERSITY.—At Guy's Hospital Medical School, 5.30 p.m., second and last lecture by Dr. Bernard B. Brodie (National Heart Institute, Bethesda, U.S.A.): Biochemical and Clinical Implications of Studies in Drug Metabolism.

MIDDLESEX COUNTY MEDICAL SOCIETY.—At Clare Hall Hospital, 3 p.m., clinical meeting. Papers by Dr. J. S. Crowther: Spontaneous Pneumothorax, Review of 60 Cases; Dr. R. E. D. Harvey-Samuel: Marital Tuberculosis.

OXFORD UNIVERSITY.—At University Museum, 5 p.m., Litchfield Lecture by Professor W. T. Astbury, F.R.S.: Some Observations and Thoughts on the Structure and Mobility of Flagella.

ROYAL EYE HOSPITAL.—5.30 p.m., Mr. L. H. Savin: Ophthalmic Neurology (5).

WILLESDEN GENERAL HOSPITAL MEDICAL SOCIETY.—8.45 p.m., discussion: Medical and Surgical Aspects of Diseases of the Gall-bladder and Liver. Speakers, Dr. R. B. Terry and Mr. F. W. M. Pratt.

Thursday, May 20

●GUY'S HOSPITAL MEDICAL SCHOOL.—5 p.m., Carbutt Memorial Lecture by Dr. Michael De Bakey (Baylor, U.S.A.): Surgical Considerations of Diseases of the Aorta.

INSTITUTE OF CARDIOLOGY.—9.30 a.m., Dr. J. H. Wright: Unilateral Renal Hypertension.

LONDON JEWISH HOSPITAL MEDICAL SOCIETY.—At Medical Society of London, 8.30 p.m., Symposium: Abortion. Speakers, Mr. A. W. Bourne, Mr. L. Courts, LL.M., and Dr. H. J. Shorvon.

OXFORD UNIVERSITY.—At Radcliffe Infirmary, 5 p.m., Litchfield Lecture by Mr. C. D. Read: Post-menopausal Haemorrhage.

POSTGRADUATE MEDICAL SCHOOL OF LONDON.—4 p.m., Dr. J. F. Goodwin: Pulmonary Hypertension.

ROYAL COLLEGE OF SURGEONS OF ENGLAND.—3.45 p.m., Arnott Demonstration by Dr. F. Stansfield: Maxillary Air Sinus; 5 p.m., Hunterian Lecture by Professor V. E. Negus: Comparative Anatomy of the Nose and Paranasal Sinuses.

ROYAL EYE HOSPITAL.—5.45 p.m., Miss J. M. Dollar: Films on Operative Surgery (1).

ROYAL SOCIETY OF TROPICAL MEDICINE AND HYGIENE.—7.30 p.m., paper to be read by Dr. J. Donald Ball (Uganda): Endomyocardial Fibrosis in Africa (by Drs. A. W. Williams, J. N. P. Davies, and J. D. Ball). A discussion will follow.

ST. ANDREWS UNIVERSITY.—At Physiology Department, Dundee, 5 p.m., Professor Lawson Wilkins (Baltimore, U.S.A.): Diagnosis and Treatment of the Adrenogenital Syndrome.

ST. GEORGE'S HOSPITAL MEDICAL SCHOOL.—5 p.m., neurology demonstration by Dr. J. H. Paterson.

Friday, May 21

FACULTY OF RADIOLOGISTS.—At Royal College of Surgeons of England, 2 p.m., general meeting. Group Captain D. A. Wilson, A.F.C.: Radiological Experiences of the Atomic Explosion at Woomera. A cine-film will follow. 3.15 p.m., Skinner Lecture by Dr. F. Baclesse (Paris): Radiotherapy in Cancer of the Breast.

●INSTITUTE OF DERMATOLOGY.—5.30 p.m., clinical demonstration by Dr. R. T. Brain: Skin Diseases in Children.

POSTGRADUATE MEDICAL SCHOOL OF LONDON.—2 p.m., Dr. D. A. K. Black: Disturbed Electrolyte Metabolism in Pyloric Stenosis.

●ROYAL COLLEGE OF OBSTETRICIANS AND GYNAECOLOGISTS.—5 p.m., William Blair-Bell Memorial Lecture by Dr. Ian Donald: Atelectasis Neonatorum.

ROYAL COLLEGE OF SURGEONS OF ENGLAND.—5 p.m., Webb-Johnson Lecture by Professor H. F. Humphreys: Value of the Teeth as Evidence—Scientific, Clinical, and Forensic.

ST. MARY'S HOSPITAL MEDICAL SCHOOL.—At Wright-Fleming Theatre, 5 p.m., Professor G. W. Pickering: Obstetric/Gynaecological Conference.

Saturday, May 22

INSTITUTE OF ORTHOPAEDICS.—At 234, Great Portland Street, W., 10 a.m., clinical demonstration by Mr. P. H. Newman: Clinical Aspects of Lumbar Instability and its Complications.

LONDON ASSOCIATION OF THE MEDICAL WOMEN'S FEDERATION.—2.45 p.m., visit to Royal Horticultural Society Gardens at Wisley.

Any Questions?

Correspondents should give their names and addresses (not for publication) and include all relevant details in their questions, which should be typed. We publish here a selection of those questions and answers which seem to be of general interest.

Vision for the Navy

Q.—*What visual standards are required of entrants to the Royal Navy? I am sometimes asked this by the parents of boys who are considering a career in that Service.*

A.—The visual standards for entry into the Royal Navy vary according to the branch of the Service. Acute form-vision in both eyes without glasses is required for those employed on look-out duties. Other branches accept men with moderate defects of form-vision which can be corrected by glasses, the wearing of which is permitted in some branches. In addition, colour perception must be within certain standards, and examination of the refraction and ocular muscle balance is required for certain categories. Broadly speaking, a candidate would be acceptable for some type of Naval Service, in so far as form-vision is concerned, if his unaided vision in each eye is not less than 6/60 and can be corrected with glasses to 6/12:6/12 or alternatively to 6/6:6/24.

Doctors who are consulted by prospective candidates for entry into the Royal Navy are advised to communicate with the Medical Department of the Navy, Queen Anne's Mansions, St. James's Park, London, S.W.1, indicating which particular branch of the Navy the candidate wishes to enter. Exact details of the visual standard required for the branch in question will then be provided.

Risks of Late Child-bearing

Q.—*A couple have married rather late in life. The husband is 45, the wife a nullipara of 42. They are anxious to have a child. How grave are the dangers to the mother at this age? Ought I to advise them against child-bearing?*

A.—Provided that the woman's general health is good, that the blood pressure and urine are normal, and that lesions of the pelvic organs—for example, fibroids—are excluded, child-bearing at the age of 42 or later does not carry any great risk. There is a slightly increased chance of hyperemesis, abortion, toxaemia of pregnancy, placenta praevia, faulty uterine action in labour, foetal malposition, soft tissue dystocia, and stillbirth, but the dangers tend to be exaggerated, and many women having their first baby at a comparatively late age have a surprisingly smooth pregnancy and labour. In a case such as this, where the deferment of pregnancy is the result of lack of opportunity rather than of infertility, the occurrence of conception would itself be evidence of good reproductive function, and would augur well for the pregnancy and labour. Even if complications do arise they can nowadays usually be easily treated or circumvented if the delivery is conducted in a well-equipped hospital—which it should be.

Another aspect to be considered is the increased risk of foetal malformation which is present in women more than 40 years of age. This applies mainly, if not entirely, to mongolism, and, again, the chance is not so great that it should deter a couple who are anxious for a family.

Yellow Fever Vaccine for Children

Q.—*What modification of dosage is required for children receiving yellow fever vaccine? Is a reaction to the vaccine likely?*

A.—Children of all ages receive the same dosage of yellow fever vaccine as adults. Neither local nor general reactions occur in the vast majority of cases.

Intravenous Therapy in Infants

Q.—*What are the best routes for giving saline infusions or blood to infants under conditions where there may not be facilities for "cutting down" (in the Tropics)? How safe is the anterior fontanelle for these purposes?*

A.—The best veins to use in infants, either for infusions or transfusions, are the scalp veins. Two recent modifications in technique greatly increase the chance of success. One is the use of the needle designed by Gardner and Murphy[1]: the mount is removed from a suitable needle, and a fine polythene tube is then connected directly to the shaft of the needle. This makes the needle very light; moreover, when the vein is entered blood flows back into the polythene tube without the application of any suction. A second very helpful modification is the use of plaster bandages to keep the needle in place.[2] In some infants the arm veins may be used in the same way, without cutting down.

Most paediatricians consider that the anterior fontanelle should not be used except possibly in special emergencies when superficial veins cannot be entered and speed is vital.

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1 *Amer. J. Dis. Child.*, 1950, **80**, 303.
2 *Lancet*, 1951, **1**, 1230.

Caponized Cockerels

Q.—*I understand that extensive use is made of oestrogens to caponize cockerels in order to eradicate the crowing nuisance. Is there any likelihood that the oestrogens will affect human beings when the cockerel is eaten?*

A.—Cockerels are treated with oestrogens not only to stop them from crowing but also to make their flesh tender. The usual practice is to insert a pellet of stilboestrol, or some other oestrogen, subcutaneously in the neck of the bird. Provided the neck is discarded before cooking, there is no danger of ill-effects to human beings. A large number of birds would have to be eaten at one sitting in order to obtain a therapeutic dose of oestrogen. Reproductive abnormalities have been reported, however, among minks on fur farms as the result of the inclusion of the heads and necks of oestrogenized cockerels in their diet.

Syphilitic Blood and Transfusion

Q.—*Can you tell me if any work has been done to discover a safe method of giving possible Wassermann-positive blood in blood transfusion? I am practising in a primitive area where Wassermann or Kahn testing would be difficult to carry out routinely. Would, for instance, the addition of penicillin to the bottle help at all?*

A.—There are several reports in the literature of experimental investigations in which arsenical drugs or penicillin were added to blood containing *Treponema pallidum*, the infectivity of which was then tested by injection into rabbits' testes. So far as the writer knows there are no reports of the routine use by transfusion services of any of these methods. Probey[1] states that the addition of 6,000 units of penicillin per ml. to blood or plasma inoculated with a rich suspension of *T. pallidum* prevented the transmission of syphilis to rabbits, provided that the penicillin was added to the blood or plasma 24 hours before injection. Schmidt[2] reports that "hämosept" (a German proprietary form of a phenylarsenoxide) in a final concentration of 1:50,000 will kill *T. pallidum* in blood kept at room temperature for 15 minutes, and that in this concentration the drug will also kill *Trypanosoma rhodesiense* and *T. gambiense* in five minutes. Bessemans and Derom[3] found that "chinosol" (potassium oxyquinoline sulphate) in a concentration of 1:1,000 rendered citrated blood containing *T. pallidum* non-infective to the rabbit after 20 minutes, and claim that the drug does not damage the red cells and is innocuous to the patient. Eichenlaub, Stolar, and Wode[4] recommend the addition of 1 mg. "mapharsen" (oxophenarsine hydrochloride) per 500 ml. blood. Confirmation is desirable before any of these procedures is used routinely.

A simpler method of dealing with *T. pallidum* in blood, which may be available to your correspondent, is to keep the blood at 4°–6° C. for six days. Several investigators[5–9] have shown that under these conditions blood and plasma heavily inoculated with *T. pallidum* lose their infectivity. The time of storage at 4°–6° C. which is effective will depend upon the degree of infection. The experimental results suggest that six days is fully adequate, and support is lent to this by the paucity of reports of syphilis transmitted by blood transfusion in the years since 1946, which have seen a large increase in the use of this form of treatment.

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3 Bessemans, A., and Derom, R. (1946). *Rev. belge. Sci. med.*, **17**, 177.
4 Eichenlaub, F. J., Stolar, R., and Wode, A. (1941). *Arch. Derm. Syph.*, **44**, 441.
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NOTES AND COMMENTS

Deodorants in General Practice.—Dr. G. S. W. EVANS (High Wycombe) writes: May I suggest an additional and simple method of reducing the offensive odour in houses where certain types of diseases are being treated ("Any Questions?" April 24, p. 996)? Take a shovel of red-hot coals, pour an ounce (28 ml.) or two of "Jeyes Fluid" on to them, and, holding the shovel, walk round the affected area. The fumes which are given off do more to abolish offensive smells than most other deodorants. This procedure is not original, but I am surprised that its simplicity and effectiveness do not make its usage more extensive.

Dr. H. MAITLAND MOIR (Currie, Midlothian) writes: One used to be able to buy a small cardboard box with a red ribbon, which, lit with a match, glowed and gave off a pleasant incense-scented smoke. This smoke masked *any* odour. It was called "Ribbon of Bruges." Whether it is still available I do not know.

Ammoniacal Dermatitis in Infants.—Lieutenant-Colonel J. MACKAY-DICK, R.A.M.C. (Connaught Hospital, Hindhead), writes: Ammoniacal dermatitis in infants ("Any Questions?" April 10, p. 887) is believed to be the result of local action of ammonia produced by interaction of an organism in the stool and a highly acid urine. An excellent form of treatment is early recognition of the condition combined with rapid alkalinization of the urine, local hygiene and careful cleansing, together with the local application of castor oil and zinc oxide ointment. Both my children suffered from this condition in infancy, and the results of this treatment in them and in others were remarkably speedy.

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